
JOANNES EVELYN ARM.

SILVA:

OR, A

DISCOURSE

OF

FOREST-TREES,

AND THE

Propagation of TIMBER in his Majesty's Dominions:

As it was delivered in the ROYAL SOCIETY
on the 15th Day of October, 1662,

Upon Occasion of certain Quæries propounded to that illustrious Assembly, by the Honourable the Principal Officers and Commissioners of the Navy.

TOGETHER WITH

An Historical Account of the Sacredness and Use of STANDING GROVES.

By JOHN EVELYN, Esq;
Fellow of the ROYAL SOCIETY.
With Notes by A. HUNTER, M. D. F. R. S.

NON CARET UMBRA DEO. —— STATIUS.

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M.DCC.LXXVI.

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TO

SIR FREDERICK EVELYN BARONET

THIS EDITION OF THE

SILVA

WRITTEN BY HIS ILLUSTRIOUS

ANCESTOR

IN THE YEAR MDCLXIV

IS INSCRIBED

BY HIS MOST OBEDIENT SERVANT

A. HUNTER.

THE EDITOR's PREFACE.

IT may appear a matter of ſingularity that a perſon of my Profeſſion ſhould engage in a work which, it muſt be confeſſed, has but a ſmall alliance with Medicine. But I wiſh to have it known, that, during the whole time this Edition was under my hands, I conſidered it only as affording amuſement, and relaxation from ſtudies of a ſeverer kind. To liberal minds this will be a ſufficient apology. To perſons of a different turn I have nothing to obſerve. Tacitus ſays, *Ad utilitatem vitæ omnia facta conſiliaque noſtra ſunt dirigenda.* And I could produce proofs of the higheſt authority to confirm this excellent ſentiment; —— but an age greedy in purſuit of natural knowledge needs no incitements.

The expence attending this work would have deterred me from the proſecution of it almoſt as ſoon as begun, had it not been for a moſt diſtinguiſhed Patronage, under whoſe recommendation the Subſcription filled beyond my moſt ſanguine expectations.

Since the firſt Edition of the Silva, in 1664, many improvements have been made in planting, and in every branch of natural knowledge. It, therefore, became my indiſpenſable duty to bring down the improvements to the preſent time. Theſe make the ſubject of the Notes, which are drawn from the moſt reſpectable authorities. I aſſume no merit beyond the arrangement of the materials, having in all places preſerved the author's own words, excepting in caſes where the ſenſe was obſcured by an impropriety of expreſſion. To join the ſentiments of ſo many different writers, ſo as to appear with the uniformity of one Author, required at firſt a conſiderable degree of attention, but the compoſition grew more eaſy in proportion as the ſubject became more familiar. To the following Authors I ſtand particularly indebted: Sir Charles Linnæus, the Rev. Dr. Stephen Hales, the Rev. Mr. Hart, Mr. Bradley, the Rev. Mr. Hanbury, Mr. P. Millar, Monſ. Duhamel, and Profeſſor Kalm; and I make this public acknowledgment to avoid the charge of plagiariſm. The Philoſophical Tranſactions of London, have, in many inſtances, been of ſingular ſervice to me; and I have had frequent occaſion to introduce extracts from my own Georgical Eſſays. I alſo acknowledge to have received much aſſiſtance

from James Farquarſon, Eſq; of Invercauld whoſe excellent Memoir upon the Cultivation of the Scotch Pine is inſerted in p. 270—281.

Mr. Speechly, Gardener to his Grace the Duke of Portland, by his Grace's orders, tranſmitted to me the account publiſhed in p. 90—99, deſcribing the method of planting upon his Grace's eſtates in Nottinghamſhire; and I have great ſatisfaction in being authorized to ſay, that this moſt excellent Planter has his Grace's permiſſion to direct Gentlemen in the manner of forming Plantations——for which he is well qualified in all the varieties of ſoil and ſituation. From the ſame judicious Perſon I am favoured with the ſupplemental Note inſerted in p. 599, deſcribing a method of raiſing PINES without the uſe of Tanners' Bark.

I wiſh to be known to have received favours from Joſeph Banks, Eſq; whoſe deſire after natural knowledge is not confined within the limits of the habitable world *.

His Grace the Duke of Portland lays me under the greateſt obligation, by preſenting this work with two moſt elegant Views of the GREENDALE OAK. Mr. Grimm's delineation of this venerable Tree deſerves the higheſt encomiums; and I have great ſatisfaction in acknowledging the merits of Meſſrs. Rooker and Vivares, whoſe Engravings have done it all imaginable juſtice. Each View has its Skeleton annexed, that the excellence of the Workmanſhip might not be injured by the table of menſuration. Mr. John Miller has ſhewn great elegance and correctneſs in his department as a Draughtſman and Engraver; and I am ſingularly obliged to Mr. Bartolozzi for the fine Head of Mr. Evelyn, which ſtands an unrivalled monument of his excellence as an Artiſt.

I beg leave to preſent my warmeſt acknowledgments to Sir John Ruſſel, Bart. and Thomas Frankland, Eſq; for their friendly care in overlooking the Artiſts in their different departments. Without their aſſiſtance the plates would have been leſs worthy of the public approbation.

I eſteem myſelf greatly indebted to William Burgh, Eſq; for an elegant Drawing of the COWTHORP OAK. To this Gentleman, and to my moſt excellent and learned friend the Rev. Mr. Cappe, I am under the higheſt

* Vide A Voyage towards the North Pole, undertaken by the Hon. Capt. Phipps in the year 1773. Introduct. p. 12.

obligations for their kind aſſiſtance in the elucidation of ſeveral obſcure paſſages and corruptions of the text.

Having explained my motives for undertaking this deſign, and acknowledged my obligations where due, either for civility or information, I have nothing left but to obſerve, that the liberties I have taken with the Text, in a variety of places, are warranted from a careful Collation of the five Editions with ſome Original Manuſcripts, without which I could not poſſibly have proceeded with any degree of ſatisfaction; for of all the books in the Engliſh Language, there are, perhaps, none ſo corrupted as the two laſt Editions of the Silva: The one printed in 1704; the other in 1729.

Soon after the publication of the Silva, which made its appearance in 1664 under the Auſpices of the Royal Society, the Spirit for Planting increaſed to a high degree; and there is reaſon to believe that many of our ſhips which, in the laſt war, gave laws to the whole world, were conſtructed from Oaks planted at that time. The preſent age muſt reflect upon this with gratitude; and it is to be hoped that we ſhall be ambitious to receive from poſterity the ſame acknowledgments that we, at this moment, pay to the memory of our virtuous Anceſtors.

York, Auguſt 1, 1776. A. HUNTER.

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THE

LIFE of Mr. JOHN EVELYN.*

JOHN EVELYN, the author of this moſt excellent and laborious work, was born at Wotton in Surry, the ſeat of his father Richard Evelyn, Eſq; upon the 31ſt of October, 1620. He was deſcended from a very antient and honourable family, which flouriſhed originally in Shropſhire; and was firſt ſettled at Wotton, in the reign of Queen Elizabeth. He was inſtructed in grammar and claſſical learning at the free-ſchool at Lewes in Suſſex; from whence, in the year 1637, he was removed, and entered as a Gentleman-Commoner at Baliol College in Oxford. He remained there for about three years, proſecuting his academical ſtudies with great diligence; and then removed to the Middle Temple in London, in order to add a competent knowledge of the laws of his country to his philological and philoſophical acquiſitions. Upon the breaking out of the Civil War, he repaired to Oxford; where he obtained leave from King Charles I. under his own hand, to travel into foreign countries for the completion of his education. In the ſpring of 1644 he left England, in order to make the tour of Europe; which he performed very ſucceſsfully, making it his buſineſs to inquire carefully into the ſtate of the ſciences, and the improvements made in all uſeful arts, wherever he came. He ſpent ſome time at Rome, and happened to be there at the time of Laud's death, which gave him an opportunity of vindicating, in ſome meaſure, the memory of that honeſt, but raſh and zealous man. "I was at Rome," ſays Mr. Evelyn, "in the company of divers of the Engliſh fathers, when the "news of the Archbiſhop's ſufferings, and a copy of his ſermon made "upon the ſcaffold, came thither. They read the ſermon, and commented "upon it, with no ſmall ſatisfaction and contempt; and looked on him as "one that was a great enemy to them, and ſtood in their way, while one of "the blackeſt crimes, imputed to him, was his being popiſhly affected."

Mr. Evelyn viſited alſo other parts of Italy, for the ſake of improving himſelf in architecture, painting, the knowledge of antiquities, medals,

* This Life of Mr. Evelyn is taken from the BIOGRAPHIA BRITANNICA —— and is given nearly in the words of the ingenious Authors of the BIOGRAPHICAL DICTIONARY.

and the like. His early affection to, and ſkill in the fine arts, appeared during his travels; for we find, that he delineated on the ſpot the proſpects of ſeveral remarkable places that lie betwixt Rome and Naples: more particularly, "The Three Taverns, or the Forum of Appius," mentioned in the Acts of the Apoſtles; "the promontory of Anxur; a proſpect of "Naples from mount Veſuvius; a proſpect of Veſuvius, as it appears to-"wards Naples; the mouth of mount Veſuvius:" all which were engraved from our author's ſketches by Hoare, an eminent artiſt at that time. He returned to Paris in the year 1647; where, being recommended to Sir Richard Browne, Bart. the King's Miniſter there, he made his addreſſes to his only daughter Mary, whom he ſoon after married, and by whom he became poſſeſſed of Sayes-Court near Deptford in Kent, where he reſided after his return to England, which was about the year 1651. Some time before this he had commenced author; and the following pieces ſeem to be the firſt productions of his pen: 1. "Of Liberty and Servitude." 1649, 12mo. Tranſlated from the French. 2. "A Character of England, as it "was lately preſented in a letter to a Nobleman of France, with reflections "on Gallus Caſtratus." 1651, 16mo. The third edition of this book appeared in 1659: at preſent it is very ſcarce. 3. "The State of France." 1652, 8vo. 4. "An Eſſay on the firſt book of Lucretius, interpreted "and made into Engliſh Verſe." 1656, 8vo. This tranſlation was decorated with a frontiſpiece, deſigned by his ingenious Lady; and with a panegyrical copy of verſes by Mr. Waller, prefixed to it. 5. "The French "Gardener; inſtructing how to cultivate all ſorts of fruit-trees and herbs "for the garden." 1658, and ſeveral times after. In moſt of the editions is added, "The Engliſh Gardener vindicated, by John Roſe, Gardener to "King Charles II. with a tract of the making and ordering of wines in "France." The third edition of the "French Gardener," which came out in 1676, was illuſtrated with copper-plates. 6. "The Golden Book of "St. Chryſoſtom, concerning the Education of Children." 1659, 12mo.

The ſituation of publick affairs induced Mr. Evelyn to live very retired at Sayes-Court; and ſo fond was he of this rural retreat, that he ſeemed determined to enjoy retirement for life. This ſtudious diſpoſition, together with his diſguſt of the world, occaſioned by the violence and confuſion of the times, was ſo ſtrong, that he actually propoſed to Mr. Boyle the raiſing a kind of college for the reception of perſons of the ſame turn of mind; where they might enjoy the pleaſure of ſociety, and at the ſame time paſs their days without care or interruption. His letter to Mr. Boyle,

in which the following plan of a college is contained, is dated the third of September, 1659, and exhibits an agreeable portrait of his philoſophic and contemplative mind.

" I propoſe the purchaſing of thirty or forty acres of land, in ſome " healthy place, not above twenty-five miles from London; of which a " good part ſhould be tall wood, and the reſt up-land paſtures, or downs " ſweetly irrigated. If there were not already a houſe, which might be " converted, &c. we would erect, upon the moſt convenient ſite of this, " near the wood, our building, viz. one handſome pavillion, containing a " refectory, library, withdrawing-room, and a cloſet; this the firſt ſtory: " For we ſuppoſe the kitchen, larders, cellars, and offices, to be contrived " in the half-ſtory under ground. In the ſecond ſhould be a fair lodging- " chamber, a pallet-room, a gallery, and a cloſet; all which ſhould be " well and very nobly furniſhed, for any worthy perſon that might deſire " to ſtay any time, and for the reputation of the college: The half-ſtory " above for ſervants, wardrobes, and like conveniences. To the entry fore " front of this court, and at the other back front, a plot walled in, of a " competent ſquare for the common ſeraglio, diſpoſed into a garden; or it " might be only carpet, kept curiouſly, and to ſerve for bowls, walking, " or other recreations, &c. if the company pleaſe. Oppoſite to the houſe, " towards the wood, ſhould be erected a pretty chapel; and, at equal diſ- " tances, even within the flanking walls of the ſquare, ſix apartments or " cells for the members of the ſociety, and not contiguous to the pavillion; " each whereof ſhould contain a ſmall bed-chamber, an outward room, a " cloſet, and a private garden, ſomewhat after the manner of the Carthu- " ſians. There ſhould likewiſe be an elaboratory, with a repoſitory for " rarities and things of nature: an aviary, dove-houſe, phyſic-garden, " kitchen-garden, and a plantation of orchard-fruit, &c. all uniform build- " ings, but of ſingle ſtories, or a little elevated. At convenient diſtance, " towards the olitory garden, ſhould be a ſtable for two or three horſes, " and a lodging for a ſervant or two. Laſtly, a garden-houſe and con- " ſervatory for tender plants. The eſtimate amounts thus: The pavillion, " four hundred pounds; the chapel, one hundred and fifty pounds; apart- " ments, walls, and out-houſing, ſix hundred pounds; the purchaſe of the " fee for thirty acres, at fifteen pounds per acre, eighteen years purchaſe, " four hundred pounds. The total, fifteen hundred and fifty pounds: " Sixteen hundred pounds will be the utmoſt. Three of the cells or apart- " ments, that is, one moiety, with the appurtenances, ſhall be at the diſpo-

" ſal of one of the founders, and the other half at the other's. If I and my
" wife take up two apartments, (for we are to be decently aſunder how-
" ever I ſtipulate, and her inclination will greatly ſuit with it) that ſhall be
" no impediment to the ſociety, but a conſiderable advantage to the œco-
" nomic part: A third ſhall be for ſome worthy perſon. And, to facilitate
" the reſt, I offer to furniſh the whole pavillion compleatly, to the value of
" five hundred pounds, in goods and moveables, if need be for ſeven years,
" 'till there ſhall be a public ſtock. There ſhall be maintained at the
" public charge, only a chaplain well qualified; an antient woman to dreſs
" the meat, waſh, and do all ſuch offices; a man to buy proviſions, keep
" the garden, horſes, &c. a boy to aſſiſt him and ſerve within. At one
" meal a-day, of two diſhes only, unleſs ſome little extraordinary upon par-
" ticular days or occaſions, (then never exceeding three) of plain and whole-
" ſome meat; a ſmall refection at night; wine, beer, ſugar, ſpice, bread,
" fiſh, fowl, candles, ſoap, oats, hay, fuel, &c. at four pounds per week;
" two hundred pounds per annum: Wages, fifteen pounds; keeping the
" gardens, twenty pounds; the chaplain, twenty pounds per annum. Laid
" up in the treaſury one hundred and forty-five pounds, to be employed for
" books, inſtruments, drugs, trials, &c. The total four hundred pounds
" a-year, comprehending the keeping of two horſes for the chariot or the
" ſaddle, and two kine. So that two hundred pounds per annum will be the
" utmoſt that the founders ſhall be at to maintain the whole ſociety, conſiſt-
" ing of nine perſons, (the ſervants included) though there ſhould no others
" join, capable to alleviate the expence. But if any of thoſe who deſire to
" be of the ſociety be ſo well qualified as to ſupport their own particulars,
" and allow for their proportion, it will yet much diminiſh the charge: And
" of ſuch there cannot want ſome at all times, as the apartments are empty.
" If either of the founders thinks expedient to alter his condition, or that
" any thing do HUMANITUS CONTINGERE, he may reſign to another, or ſell
" to his colleague, and diſpoſe of it as he pleaſes, yet ſo as it ſtill continue
" the inſtitution. ORDERS: At ſix in ſummer, prayers in the chapel. To
" ſtudy 'till half an hour after eleven. Dinner in the refectory, till one.
" Retire 'till four. Then call to converſation (if the weather invite) abroad,
" elſe in the refectory. This never omitted but in caſe of ſickneſs. Pray-
" ers at ſeven. To bed at nine. In the winter the ſame, with ſome abate-
" ments for the hours, becauſe the nights are tedious, and the evening's
" converſation more agreeable. This in the refectory. All play interdicted,
" *ſans* bowls, cheſs, &c. Every one to cultivate his own garden. One

" month in ſpring, a courſe in the elaboratory on vegetables, &c. In the " winter, a month on other experiments. Every man to have a key of " the elaboratory, pavillion, library, repoſitory, &c. Weekly faſt. Com- " munion once every fortnight, or month at leaſt. No ſtranger eaſily ad- " mitted to viſit any of the ſociety but upon certain days weekly, and that " only after dinner. Any of the ſociety may have his commons to his apart- " ment, if he will not meet in the refectory, ſo it be not above twice a- " week. Every Thurſday ſhall be a muſic-meeting at converſation hours. " Every perſon of the ſociety ſhall render ſome public account of his ſtudies " weekly, if thought fit; and, eſpecially, ſhall be recommended the pro- " motion of experimental knowledge, as the principal end of the inſtitution. " There ſhall be a decent habit and uniform uſed in the college. One " month in the year may be ſpent in London or any of the univerſities, " or in a perambulation for the public benefit, with what other orders " ſhall be thought convenient." *Boyle's Works*, Vol. II.

The moment that a proſpect appeared of the King's reſtoration, our Author quitted Philoſophy for Politicks; and, upon an attempt being made to damp the deſires of the people for the King's return, he drew his pen in that critical and important ſeaſon, in defence of the Royal Perſon and Cauſe. The title of his piece was, 7. " An Apology for the Royal " Party, written in a letter to a perſon of the late Council of State; with a " touch at the pretended Plea of the Army." 1659, 4to. This pamphlet had a good effect, and was generally ſo well received, that it ran through three impreſſions that year. Soon after came out a piece, intitled, " News " from Bruſſels, in a letter from a near attendant on his Majeſty's Perſon, to " a perſon of honour here, dated March 10, 1659." The deſign of this pretended letter was to repreſent the character of King Charles II. in as bad a light as poſſible; and intended to deſtroy the impreſſion which had been propagated to his advantage. All the King's friends were extremely alarmed at this attempt, and Mr. Evelyn as much as any of them; who, to furniſh an antidote to this poiſon with all poſſible ſpeed, ſent abroad, in a week's time, a complete anſwer, which bore the following title: 8. " The " late News or Meſſage from Bruſſels unmaſked." 1659, 4to.

Immediately after the King's return, Mr. Evelyn was introduced to, and graciouſly received by him; nor was it long before he received a very ſingular mark of the King's eſteem for, and confidence in him: for he was choſen by his Majeſty to draw up " A narrative of a diſpute and quarrel

" for Precedence, which happened between the Spaniſh and French Am-
" baſſadors," and which would have occaſioned a war between thoſe na-
tions, if the King of Spain, though he gained the better in the preſent ſcuffle, had not agreed to yield precedence to the French upon all future occaſions without any diſpute. Mr. Evelyn began now to enter into the active ſcenes of life, but yet without bidding adieu to his ſtudies; on the contrary, he publiſhed, in the ſpace of a few months, no leſs than four pieces: as, 9. " A Panegyric at his Majeſty King Charles the Second's
" Coronation, 1661," folio. 10. " Inſtructions concerning the erecting of a
" Library, tranſlated from the French of Gabriel Naudé, with ſome improve-
" ments by himſelf," 1661, 8vo. 11. " Fumifugium; or the inconveniencies
" of the air and the ſmoke of London diſſipated, together with ſome reme-
" dies humbly propoſed," 1661, 4to. This was addreſſed to the King and Parliament, and publiſhed by his Majeſty's expreſs command. 12. " Ty-
" rannus; or the Mode: in a diſcourſe of ſumptuary laws," 1661, 8vo. In the year 1662, when the Royal Society was eſtabliſhed, Mr. Evelyn was appointed one of the firſt Fellows and Council. He had given a proof the ſame year, how well he deſerved that diſtinction, by a ſmall but excellent work, intitled, 13. " Sculptura; or, the Hiſtory and Art of Chalcography
" and Engraving in Copper, with an ample enumeration of the moſt re-
" nowned Maſters and their works: To which is annexed a new manner of
" engraving or mezzotinto, communicated by his Highneſs Prince Rupert
" to the Author of this treatiſe." 1662, 12mo. A ſecond edition of this work, which was become exceedingly ſcarce and dear, was printed in 1755, 12mo; " containing ſome corrections and additions taken from the margin
" of the author's printed copy, an etching of his head, an exact copy of
" the Mezzotinto done by Prince Rupert, a tranſlation of all the Greek
" and Latin paſſages, and memoirs of the Author's life."

Upon the firſt appearance of the nation's being obliged to engage in a war with the Dutch, the King thought proper to appoint Commiſſioners to take care of the ſick and wounded; and Mr. Evelyn was one of the number, having all the ports between Dover and Portſmouth for his diſtrict. This was in 1664; within the compaſs of which year his literary labours were not only as great, but even greater, than in any of thoſe preceding. This aroſe from his earneſt deſire to ſupport the credit of the Royal Society; and to convince the world, that philoſophy was not barely an amuſement, fit only to employ the time of melancholy and ſpeculative people, but an high and uſeful ſcience, worthy the attention of men of the

greateſt parts, and capable of contributing in a ſupreme degree to the welfare of the nation. With this view he publiſhed, 14. "Silva: or, a "Diſcourſe of Foreſt-trees, and the Propagation of Timber in his Majeſty's "Dominions. To which is annexed, Pomona: or, an Appendix concerning "Fruit-trees, in relation to cyder; the making and ſeveral ways of ordering "it." 1664, folio. This moſt valuable work was written at the requeſt of the Royal Society, "upon occaſion," as the title tells us, "of certain "queries propounded to that illuſtrious aſſembly by the honourable the "principal Officers and Commiſſioners of the Navy;" and publiſhed by their order. It has undergone ſeveral editions; a ſecond in 1669; a third in 1679, with great additions and improvements; a fourth in 1705, ſtill conſiderably augmented; and a fifth in 1729, with all the leſſer pieces of our Author relating to Agriculture and Gardening annexed, as they were in the fourth. But theſe two laſt editions are extremely incorrect.

As a diligent peruſal of this laſt uſeful treatiſe may animate our Nobility and Gentry to improve their eſtates by the never-failing methods there recommended, ſo an attentive ſtudy of our author's next work may perhaps contribute to improve their taſte in building. It is intitled, 15. "A "Parallel of the antient Architecture with the modern, in a collection of "ten principal authors, who have written upon the five orders, viz. Palladio "and Scamozzi, Gerlio and Vignola, D. Barbaro and Cataneo, L. B. Al"berti and Viola, Bullart and De Lorme, compared with one another. The "three orders, Doric, Ionic, and Corinthian, compriſe the firſt part of this "treatiſe; and the two Latin, Tuſcan and Compoſite, the latter. Written "in French by Rowland Freart, Sieur de Chambray; made Engliſh for the "benefit of Builders. To which is added, an account of Architects and "Architecture, in an hiſtorical and etymological explanation of certain terms, "particularly affected by Architects. With Leo Baptiſta Alberti's Treatiſe "of Statues." 1664, folio. This work, as well as the former, is dedicated to King Charles II. A ſecond edition of it was publiſhed in 1669; a third in 1697; and a fourth in 1733, to which is annexed "The Elements of Architecture, collected by Sir Henry Wotton, and alſo other large additions." 16. Μυστηριον της Ανομιας: "that is, another part of the Myſtery of "Jeſuitiſm; or the new Hereſy of the Jeſuits, publickly maintained at Paris "in the College of Clermont, the 12th of December, 1661, declared to all "the Biſhops of France, according to the copy printed at Paris; together "with the imaginary hereſy, in three letters: with divers other particulars

" relating to this abominable myſtery, never before publiſhed in Engliſh." 1664, 8vo. This is the only piece of a controverſial turn among Mr. Evelyn's works. It has not indeed his name to it: But that it is really his, we learn from a letter written by him to Mr. Boyle. 17. " Kalendarium " Hortenſe; or, the Gardener's Almanac, directing what he is to do monthly " throughout the year, and what fruits and flowers are in prime." 1664, 8vo. The ſecond edition of this book was dedicated to Mr. Cowley, with whom our author maintained a long and inviolable friendſhip; and it occaſioned Mr. Cowley to addreſs to him his mixt eſſay in proſe and verſe, intitled " The Garden." The Kalendarium Hortenſe went thro' a vaſt number of editions. The author made additions to it as long as he lived, ſo that the beſt is that which was printed by way of appendix to the fourth and laſt edition of the SILVA in his life-time, which is alſo in the fifth edition of that work printed after his deceaſe.

About this time the univerſity of Oxford received a noble and laſting teſtimony of Mr. Evelyn's gratitude to the place of his education; for it was he who prevailed with the Lord Henry Howard to beſtow the Arundelian marbles, then remaining in the garden of Arundel-houſe in London, on that univerſity. Lord Howard was alſo ſtrongly importuned by Mr. Evelyn to ſend to Oxford an exquiſite ſtatue of Minerva; but the ſudden death of that Lord prevented its removal from Arundel-houſe in the Strand. Mr. Evelyn ſpent his time at this juncture in a manner as pleaſing as he could wiſh: He had great credit at court, and great reputation in the world; was one of the commiſſioners for rebuilding St. Paul's, attended the meetings of the Royal Society with great regularity, and was punctual in the diſcharge of his office as a commiſſioner of the ſick and wounded. Yet, in the midſt of his employments, he found leiſure to add freſh labours to thoſe he had already publiſhed: As, 18. " The " Hiſtory of the three late famous Impoſtors, viz. Padre Ottomano, pre- " tended ſon and heir to the late Grand Seignior; Mahomet Bei, a " pretended Prince of the Ottoman family, but in truth a Wallachian " counterfeit; and Sabbata Levi, the ſuppoſed Meſſiah of the Jews, " in the year 1666; with a brief account of the ground and occa- " ſion of the preſent war between the Turk and Venetian: Together " with the cauſe and final extirpation, deſtruction, and exile of the Jews " out of the Empire of Perſia." 1668, 8vo. Theſe little hiſtories abound with curious facts; many of which, Mr. Evelyn ſays, he received from the mouth of a Perſian ſtranger of quality, who had lately reſided in Lon-

don. This work was highly commended in the Acta Eruditorum Lipſienſium for the year 1690, with this remarkable circumſtance, that the pretended Mahomet Bei was at that very time in the city of Leipſic. Sir George Mackenzie, an admired eſſay-writer of that age, having written "A Panegyric on Solitude," our author, by way of antidote, publiſhed a piece, intitled, 19. "Public Employment and an active Life, "with all its Appanages, preferred to Solitude." 1667, 12mo. 20. "An "Idea of the Perfection of Painting, demonſtrated from the principles of "art, and by examples conformable to the obſervations which Pliny and "Quintilian have made upon the moſt celebrated pieces of the ancient "painters, paralleled with ſome works of the moſt famous modern pain-"ters, Leonardo da Vinci, Raphael, Julio Romano, and N. Pouſſin: "Written in French by Rowland Freart, and now tranſlated." 1668, 12mo.

In the year 1669, Mr. Evelyn made a journey to Oxford, where he was honoured with a doctor of law's degree, as a mark of gratitude for the credit and ſervices he had done them. To ſay the truth, he obtained all his honours without any ſolicitation of his own. Thus, when King Charles II. in order to promote trade, thought proper to erect a board for that purpoſe, and named ſeveral perſons of great rank to be members of that council, he likewiſe appointed Mr. Evelyn to be amongſt them; who, to expreſs his gratitude for the favour, digeſted, in a ſhort and plain diſcourſe, the chief heads of the hiſtory of trade and navigation, and dedicated it to the King. The title of it runs thus: 21. "Navigation and Com-"merce; their original and progreſs: Containing a ſuccinct account of "traffic in general; its benefits and improvements; of diſcoveries, wars, and "conflicts at ſea, from the original of navigation to this day; with ſpecial "regard to the Engliſh nation; their ſeveral voyages and expeditions, to "the beginning of our late differences with Holland: In which his Ma-"jeſty's title to the dominion of the ſea is aſſerted againſt the novel and "later Pretenders." 1674, 12mo. The Royal Society having ordered that every member of the council ſhould in his turn pronounce, at their ſeveral meetings, a diſcourſe on ſome ſubject of experimental philoſophy, Mr. Evelyn preſented them with a treatiſe, intitled, 22. "TERRA: A Phi-"loſophical Diſcourſe of Earth, relating to the culture and improvement "of it for vegetation, and the propagation of plants," which was printed in 1675, in folio and 8vo. The winter of 1683 being memorably ſevere,

the fine plantations of our author at Sayes-Court ſuffered irreparable damage; of which he gave a philoſophical and pathetical account to the Royal Society the ſucceeding ſpring. But the Czar of Muſcovy, who afterwards reſided in this houſe of Mr. Evelyn, for the ſake of being near Deptford-yard, is ſaid to have committed almoſt as great devaſtations on his delicious garden as this lamentable froſt.

After the acceſſion of King James II. we find Mr. Evelyn, in December 1685, appointed, with Lord Viſcount Tiviot and Colonel Robert Philips, one of the Commiſſioners for executing the office of Lord Privy-ſeal, in the abſence of Henry Earl of Clarendon, Lord Lieutenant of Ireland; which place he held till the 11th of March, 1686, when the King was pleaſed to make Henry Baron Arundel, of Wardour, Lord Privy-ſeal. He wrote nothing during this reign. After the revolution, he was made Treaſurer of Greenwich Hoſpital; and, though he was then much in years, yet he continued to publiſh treatiſes upon ſeveral ſubjects: As, 23. "Mundus Muliebris; or, the Lady's Dreſſing-Room unlocked, and her "Toilet ſpread. In burleſque. Together with the Fop-Dictionary, com-"piled for the uſe of the fair ſex." 1690, 4to. 24. "Monſieur de la "Quintinye's Treatiſe of Orange-Trees, with the raiſing of Melons, "omitted in the French Editions, tranſlated into Engliſh." 1693. 25. "Numiſmata: A Diſcourſe of Medals, antient and modern, together with "ſome account of heads and effigies of illuſtrious and famous perſons, "in ſculps and taille-douce, of whom we have no medals extant, and of "the uſes to be derived from them. To which is added, a digreſſion "concerning Phiſiognomy." 1697, folio. The connoiſſeurs look on this treatiſe as one of the perfecteſt on the ſubject in any language; and it is ſaid to be greatly admired by foreigners of taſte. We are now arrived at the laſt publication with which our author inriched the republick of letters; and it is intitled, 26. "Acetaria; or, a Diſcourſe of Sallets." 1699, 12mo. It was dedicated to the Lord Chancellor Somers, at that time Preſident of the Royal Society: And, though Mr. Evelyn was then in his eightieth year, it bears no marks of extreme age or impaired abilities.

Nor had Mr. Evelyn been leſs generous in imparting his knowledge to others out of his own private collections, than by what he had publiſhed for the uſe of all. He communicated to Mr. Boyle a curious and exact account of the method by which the magazines of ſnow are preſerved in

Italy for the uſe of the tables of the great. The late learned Biſhop of London, Dr. Gibſon, was furniſhed by him with thoſe additional remarks on the county of Surry, which are publiſhed in his Engliſh edition of Camden's Britannia. He contributed largely to Mr. Houghton's "Huſ-"bandry and Trade improved;" and Mr. Aubrey has teſtified how often he was indebted to him for his friendly aſſiſtance in many of his under-takings. In regard to the Royal Society, he was very aſſiduous in tranſ-mitting to them whatever fell within the compaſs of his inquiries, and uſed to ſtyle himſelf, humbly, "A pioneer in the ſervice of the Royal "Society." He certainly removed many obſtructions, and ſmoothed the roads that led directly to the temple of wiſdom and truth. When we conſider the number of books he publiſhed, and the variety of the ſub-jects on which he employed his time, it is impoſſible to forbear wonder-ing at his induſtry and application; and our wonder muſt be greatly heightened, when we reflect how careful he was in reviewing, correcting, and augmenting all his original works. But this is not all; for he left behind him unfiniſhed, or at leaſt unpubliſhed, works of a more extenſive nature than thoſe that are printed, which had coſt him incredible pains, and for which he had made prodigious collections. His great work of all was intended to be called "A General Hiſtory of all Trades;" of which we have an account in one of his own letters to Mr. Boyle, where he aſſigns the reaſons for laying it aſide. But though he deſiſted from the original plan, yet it was not till he had finiſhed ſeveral parts of it; particularly his Chalcography, which Mr. Boyle prevailed on him to publiſh, and the fol-lowing pieces, which he never publiſhed: "Five Treatiſes, containing a "full view of the ſeveral arts of painting in oil, painting in miniature, "annealing in glaſs, enamelling, and making marble paper;" and "The "Plan of a Royal Garden, deſcribing and ſhewing the amplitude of that "part of Georgics which belongs to Horticulture." To theſe his unpub-liſhed works we muſt add another, mentioned only by Mr. Wood, who gives us nothing concerning it but the following title: "A Treatiſe of "the Dignity of Man."

Full of age and honours, this amiable Author died upon the 27th of February, 1705-6, in the 86th year of his age; and was interred at Wot-ton, under a tomb of about three feet high of free-ſtone, ſhaped like a coffin, with an inſcription upon a white marble, with which it is covered, expreſſing, according to his own intention, that, "Living in an age of ex-

" traordinary events and revolutions, he had learned from thence this truth, " which he desired might be thus communicated to posterity: THAT ALL " IS VANITY WHICH IS NOT HONEST; AND THAT THERE IS NO SOLID WIS- " DOM BUT IN REAL PIETY." As to the Elogiums which ingenious and learned men have bestowed upon Mr. Evelyn, they are as numerous as they are great. Mr. Cowley, as we have already observed, inscribed his Poem, called, "The Garden," to him; and has said the highest things of him in the preface to it. Mr. Glanville has given a great character of our Author: "Mr. John Evelyn", says he, "hath very considerably advan- " ced the history of fruit and forest-trees, by his Silva and Pomona; and " greater things are expected from his preparations for the Elysium Bri- " tannicum, a noble design now under his hands. And certainly the in- " quisitive world is much indebted to this generous Gentleman for his " very ingenious performances in this kind; as also for those others of " sculpture, picture, architecture, and the like useful things, with which " he hath inriched it." The learned and judicious Mr. Wotton, in his " Reflections on antient and modern learning," speaks of Mr. Evelyn in still higher terms; and says, that "it may be esteemed a small charac- " ter of Mr. Evelyn's Silva, or Discourse of Forest-trees, to say that it " outdoes all that Theophrastus and Pliny have left us on that subject; " for it not only does that and a great deal more, but contains more use- " ful precepts, hints, and discoveries upon that now so necessary a part " of our Res Rustica, than the world had till then known from all the " observations of former ages." Bishop Burnet, acknowledging some communications from him, stiles him "a most ingenious and virtuous " Gentleman, who is not satisfied to have advanced the knowledge of this " age by his own most useful and successful labours about planting, and " divers other ways, but is ready to contribute every thing in his power " to perfect other men's endeavours." Another eminent author, speaking of his Numismata, bestows the following character of that book and its author: "We might justly have expected, whatever could have been de- " sired on this subject, from the excellently learned pen of Mr. Evelyn, " had he bent his thoughts, as was believed, towards the consideration of " our British coins as well as medals. It now appears that his Numismata " carried him no farther than those larger and more choice pieces that " are usually called by this latter name, whereon he has indeed treated " with that accuracy and fineness which became a gentleman and a scho- " lar."

The LIFE of Mr. JOHN EVELYN.

By his excellent wife, who ſurvived him about three years, he had five ſons and three daughters. Of the latter, one only ſurvived him, Suſanna, married to William Draper, of Adſcomb, in Surry, Eſq; of the former, all died young except Mr. John Evelyn, the author of many tranſlations both in proſe and verſe, and of ſome original compoſitions in Dryden's Miſcellanies. He was the father of Sir John Evelyn, created a Baronet by letters patent, bearing date July 30, 1713, and great grandfather to the preſent Sir Frederick Evelyn, now reſiding upon the family eſtate at Wotton in Surry.

TO THE

KING's Moſt Sacred MAJESTY,

CHARLES THE SECOND.

FOR to whom, Sir, with ſo juſt and equal right ſhould I preſent the fruits of my labours, as to the Patron of that Society, under whoſe influence it was produced, ſo to whoſe auſpices alone it owes the favourable acceptance which it has received in the world? To you then, Royal Sir, does this Fourth Edition continue its humble addreſſes, *tanquam Nemorum Vindici*; as of old, they paid their devotions *Herculi & Silvano*; ſince you are our Θεὸς ὑλικὸς *Nemorenſis Rex*; as having once your Temple, and Court too, under that ſacred Oak which you conſecrated with your preſence, and we celebrate, with juſt acknowledgment to God, for your preſervation.

I need not acquaint your Majeſty how many millions of timber-trees, beſide infinite others, have been propagated and planted throughout your vaſt dominions, at

the inſtigation, and by the ſole direction of this work; becauſe your gracious Majeſty has been pleaſed to own it publickly for my encouragement, who, in all that I here pretend to ſay, deliver only thoſe precepts which your Majeſty has put into practice; as having, like another Cyrus, by your own royal example, exceeded all your predeceſſors in the plantations you have made, beyond, I dare aſſert it, all the Monarchs of this nation, ſince the conqueſt of it. And, indeed, what more auguſt, what more worthy your Majeſty, or more becoming our imitation, than, whilſt you are thus ſolicitous for the publick good, we purſue your Majeſty's great example, and, by cultivating our decaying woods, contribute to your power, as to our greateſt wealth and ſafety; ſince whilſt your Majeſty is furniſhed to ſend forth thoſe Argos and Trojan horſes, about this happy iſland, we are to fear nothing from without it; and whilſt we remain obedient to your juſt commands, nothing from within it.

'Tis now ſome years paſt, that your Majeſty was pleaſed to declare your favourable acceptance of a Treatiſe of Architecture, which I then preſented to you, with many gracious expreſſions, and that it was a moſt uſeful piece. Sir, that encouragement (together with the ſucceſs of the book itſelf, and of the former editions of this) has animated me ſtill to continue my oblation to your Majeſty of theſe improvements: Nor was it certainly without ſome provident conduct that we have been thus ſolicitous to begin, as it were, with materials for build-

ing, and directions to builders, if due reflection be made on that deplorable calamity, the conflagration of your imperial city; which, nevertheleſs, by the bleſſing of God, and your Majeſty's gracious influence, we have ſeen riſe again a new and much more glorious Phœnix.

This tribute I now once more lay at the feet of our Royal Founder.

May your Majeſty be pleaſed to be invoked by that no inglorious title, in the profoundeſt ſubmiſſion of,

Gracious Sir,

Your Majeſty's

Ever loyal, moſt obedient, and

Faithful Subject and Servant,

Sayes-Court,
Dec. 5, 1678.

J. EVELYN.

TO THE

READER.

AFTER what the Frontiſpiece and Porch of this Wooden Edifice preſents you, I ſhall need no farther to repeat the occaſion of this following diſcourſe: I am only to acquaint you, That as it was delivered to the Royal Society by an unworthy member thereof, in obedience to their commands; by the ſame it is now republiſhed without any farther proſpect: And the reader is to know, that if theſe dry ſticks afford him any ſap, it is one of the leaſt and meaneſt of thoſe pieces which are every day produced by that illuſtrious aſſembly, and which enrich their collections, as ſo many monuments of their accurate experiments, and publick endeavours, in order to the production of real and uſeful theories, the propagation and improvement of natural ſcience, and the honour of their inſtitution. If to this there be any thing ſubjoined here, which may a while beſpeak the patience of the reader, it is only for the encouragement of an induſtry, and worthy labour, much in our days neglected, as haply reputed a conſideration of too ſordid and vulgar a nature for Noble Perſons and Gentlemen to buſy themſelves withal, and who oftner find out occaſions to fell down and deſtroy their woods and plantations, than either to repair or improve them.

But we are not without hopes of taking off theſe prejudices, and of reconciling them to a ſubject and an induſtry which has been conſecrated, as I may ſay, by as good and as great perſons as any the world has produced; and whoſe names we find mingled amongſt Kings and Philoſophers, grave Senators and Patriots of their country: for ſuch of old were Solomon, Cyrus, and Numa, Licinius, ſurnamed Stolo, Cato, and Cincinnatus; the Piſos, Fabii, Cicero, the Plinys, and thouſands more whom I might enumerate, that diſdained not to cultivate theſe ruſticities even with their own hands, and to eſteem it no ſmall acceſſion to dignify their titles, and adorn their purple with theſe rural characters of their affections to plant-

ing, and love of this part of Agriculture, which has tranſmitted to us their venerable names through ſo many ages and viciſſitudes of the world.

That famous anſwer alone which the Perſian Monarch gave to Lyſander, will ſufficiently juſtify that which I have ſaid, beſides what we might add out of the writings and examples of the reſt: But ſince theſe may ſuffice, after due reproofs of the late impolitick waſte and univerſal ſloth amongſt us, we ſhould now turn our indignation into prayers, and addreſs ourſelves to our better-natured countrymen, that ſuch woods, as do yet remain entire, might be carefully preſerved, and ſuch as are deſtroyed, ſedulouſly repaired: It is what all perſons who are owners of land may contribute to, and with infinite delight, as well as profit, who are touched with that laudable ambition of imitating their illuſtrious anceſtors, and of worthily ſerving their generation. To theſe my earneſt and humble advice ſhould be, That at their very firſt coming to their eſtates, and as ſoon as they get children, they would ſeriouſly think of this work of propagation alſo: for I obſerve there is no part of huſbandry which men commonly more fail in, neglect, and have cauſe to repent of, than that they did not begin planting betimes, without which they can expect neither fruit, ornament, or delight from their labours. Men ſeldom plant trees till they begin to be wiſe, that is, till they grow old, and find, by experience, the prudence and neceſſity of it. When Ulyſſes, after a ten years abſence, was returned from Troy, and coming home, found his aged father in the field planting of trees, he aſked him, "Why, being now ſo far advanced in years, he "would put himſelf to the fatigue and labour of planting that, of which "he was never likely to enjoy the fruits?" The good old man, taking him for a ſtranger, gently replied: "I plant, ſays he, againſt my ſon "Ulyſſes comes home." The application is obvious and inſtructive for both old and young: And we have a more modern inſtance, almoſt like that of the good old Laertes. —— Upon the complaint of learned perſons and great travellers, deploring the loſs of many rare and precious things, trees and plants, eſpecially inſtancing the Balſam-tree of Gilead, (now almoſt, if not altogether, failing, and no more to be found where it grew in great plenty) application is made to young Eperous, to conſider it ſeriouſly, and to fall a planting while time is before them, with this encouraging exclamation, "Agite, ô Adoleſcentes, & antequam cani-"ties vobis obrepat, ſtirpes jam alueritis, quæ vobis cum inſigni utilitate, "delectationem etiam adferent: Nam quemadmodum canities temporis "ſucceſſu, vobis inſciis, ſenſim obrepit: Sic natura vobis inſerviens edu-

See Petrarch de remed. utriuſque fortunæ, Lib. i. Dial. 57.

TO THE READER.

" cabit quod telluri veſtræ concredetis, modò prima initia illi dederitis, &c."
PET. BELLONIUS *De neglecta ſtirpium Cultura. Problema* ix.

My next advice is, that they do not eaſily commit themſelves to the dictates of their ignorant hinds and ſervants, who are, generally ſpeaking, more fit to learn than to inſtruct. " Male agitur cum Domino quem Villicus docet," was an obſervation of old Cato's; and it was Iſchomachus who told Socrates, diſcourſing one day upon a like ſubject, " That it was " far eaſier to make than to find a good huſbandman:" I have often proved it ſo in gardeners, and I believe it will hold in moſt of our country employments. Country people univerſally know that all trees conſiſt of roots, ſtems, boughs, leaves, &c. but can give no account of the ſpecies, virtues, or farther culture, beſides the making of a pit or hole, caſting and treading in the earth, &c. which require a deeper ſearch than they are capable of; we are then to exact labour, not conduct and reaſon, from the greateſt part of them: and the buſineſs of planting is an Art or Science, (for ſo Varro has ſolemnly defined it) and very different from what many in his time accounted of it; " Facillimam eſſe nec ullius acuminis Ruſticationem," namely, That it was an eaſy and inſipid ſtudy. It was the Simple Culture only, with ſo much difficulty retrieved from the late confuſion of an inteſtine and bloody war, like that of ours, and now put in reputation again, which made the Noble Poet write:

De R. R.

——————Verbis ea vincere magnum	——————How hard it was
Quàm ſit, & anguſtis hunc addere rebus honorem!	Low ſubjects with illuſtrious words to grace!
	Georg. iii.

Seeing, as the Orator does himſelf expreſs it, " Nihil eſt homine libero dignius," there is nothing more becoming and worthy of a Gentleman, no, not the Majeſty of a Conſul *. In antient and beſt times, men were not honoured and eſteemed for the only learned who were great linguiſts, profound critics, readers and devourers of books, but ſuch whoſe ſtudies conſiſted of the diſcourſes, documents, and obſervations of their forefathers, antient and venerable perſons, who (as the excellent author of the rites of the Iſraelites, chap. xv. &c. acquaints us) were not only obliged to inſtruct and inform their children of the wonderful things God had done for their anceſtors, together with the precepts of the Moral Law, Feaſts, and Religious Ceremonies, but taught them likewiſe all that concerned Agriculture, joined with leſſons of perpetual practice, in which they were, doubtleſs, exceedingly knowing, whilſt, during ſo many ages, they

In agris erant tunc Senatores. Cic. de Senect.
* Silvæ ſint Conſule dignæ. See this of the Poet interpreted by Scaliger. Lib. i. c. i. Poet.

employed themſelves almoſt continually in it: And tho' now-a-days this noble art be for the moſt part left to be exerciſed amongſt us by people of groſſer and unthinking ſouls, yet there is no ſcience whatever which contains a vaſter compaſs of knowledge, infinitely more uſeful and beneficial to mankind, than the fruitleſs and empty notions of the greateſt part of ſpeculatiſts, counted to be the only eruditi and learned men. An Iſraelite, who, from tradition of his forefathers, his own experience, and ſome modern reading, had informed himſelf of the religion and laws which were to regulate his life, and knew how to procure things neceſſary; who perfectly underſtood the ſeveral qualities of the earth, plants, and places agreeable to each ſort, and to cultivate, propagate, defend them from accidents, and bring them to maturity; that alſo was ſkilled in the nature of cattle, their food, diſeaſes, remedies, &c. (which thoſe who amongſt us paſs for the moſt learned and accompliſhed Gentlemen and Scholars, are, for the moſt part, groſsly ignorant of, and look upon as baſe, ruſtic, and things below them) is, in this learned author's opinion, infinitely more to be valued than a man brought up either in wrangling at the Bar, or the noiſy and ridiculous diſputes of our Schools, &c. To this ſenſe the learned Modena. And it is remarkable, that after all that wiſe Solomon had ſaid, "that All was vanity and vexation of ſpirit," among ſo many particulars he reckons up, he ſhould be altogether ſilent, and ſay nothing concerning Huſbandry; as, doubtleſs, conſidering it the moſt uſeful, innocent, and laudable employment of our life, requiring thoſe, who cultivate the ground, to live in the country, remote from city-luxury, and the temptation to the vices he condemns. It was indeed a plain man, a Potter by trade, but let no body deſpiſe him becauſe a Potter, (Agathocles, a King, was of that craft) who, in my opinion, has given us the true reaſon why Huſbandry, and particularly Planting, is no more improved in this age of ours, eſpecially where perſons are Lords and owners of much land: The truth is, ſays he, when men have acquired any conſiderable fortune by their good huſbandry and experience, (forgetting that the greateſt Patriarchs, Princes, their ſons and daughters, belonged to the plow and the flock) they account it a ſhame to breed up their children in the ſame calling which they themſelves were educated in, but preſently deſign them Gentlemen: They muſt, forſooth, have a coat of arms, and live upon their eſtates; ſo as by the time the ſon's beard is grown, he begins to be aſhamed of his father, and would be ready to defy him, that ſhould, upon any occaſion, mind him of his honeſt extraction: And if it chance that the good man have other children to provide for, *This* muſt be the darling,

Paliſſy, le Moyen de devenir Riche.

be bred at ſchool and the univerſity, whilſt the reſt muſt to cart and plow with the father. This is the cauſe, ſays my author, that our lands are ſo ill cultivated and neglected: Every body will ſubſiſt upon their own revenue, and take their pleaſure, whilſt they reſign their eſtates to be managed by the moſt ignorant, the children whom they leave at home, or the hinds to whom they commit them, when, as in truth and in reaſon, the more learning the better Philoſophers: and the greater abilities they poſſeſs, the more and the better are they qualified to cultivate and improve their eſtates. Methinks this is well and rationally argued.

And now you have in part what I had to produce in extenuation of this adventure; that, animated with a command, and aſſiſted by divers worthy perſons, (whoſe names I am prone to celebrate with all juſt reſpects) I have preſumed to caſt in my ſymbol; which, with the reſt that are to follow, may, I hope, be in ſome degree ſerviceable to him (whoever the happy perſon be) that ſhall oblige the world with that complete Syſtem of Agriculture, which as yet ſeems a Deſideratum, and wanting to its full perfection. This, I aſſure you, is one of the principal deſigns of the Royal Society, not in this particular only, but through all the liberal and more uſeful arts; for which, in the eſtimation of all equal judges, it will merit the greateſt of encouragements; that ſo at laſt, what the learned Columella has wittily reproached, and complained of, as a defect in that age of his, concerning Agriculture in general, and is applicable here, may attain its deſired remedy and conſummation in this of ours.

" Sola Res Ruſtica, quæ ſine dubitatione proxima, & quaſi conſan-
" guinea Sapientiæ eſt, tam diſcentibus egeat, quam magiſtris: Adhuc
" enim Scholas Rhetorum, & Geometrarum, Muſicorumque, vel quod
" magis mirandum eſt, contemptiſſimorum vitiorum officinas, guloſius
" condiendi cibos, & luxurioſius fercula ſtruendi, capitumque & capillo-
" rum concinnatores, non ſolum eſſe audivi, ſed & ipſe vidi; Agricolationis
" neque Doctores qui ſe profiterentur, neque Diſcipulos cognovi." But this I leave for our peruked gallants to interpret, and ſhould now apply myſelf to the directive part, which I am all this while beſpeaking, if, after what I have ſaid in the ſeveral paragraphs of the enſuing diſcourſe upon the argument of wood (and which in this edition, coming abroad with innumerable improvements and advantages, ſo furniſhed as I hope ſhall neither reproach the author or repent the reader) it might not ſeem ſuperfluous

Præfat. ad P. Silvinum; which I earneſtly recommend to the ſerious peruſal of our Gentry.

Voluptates agricolarum mihi ad ſapientis vitam proximè videntur accedere. Cic. de Senectute.

to have premiſed any thing here for the encouragement of ſo becoming an induſtry. There are divers learned and judicious men who have preceded me in this argument; as many, at leaſt, as have undertaken to write and compile vaſt herbals and theatres of plants; of which we have ſome of our own countrymen, (eſpecially the moſt induſtrious and learned Mr. Ray) who have boldly, I dare affirm it, ſurpaſſed any, if not all the foreigners that are extant. In thoſe it is you meet with the deſcription of the ſeveral plants, by diſcourſes, figures, names, places of growth, time of flouriſhing, and their medicinal virtues, which may ſupply any deficiency of mine as to thoſe particulars; if, forbearing the repetition, it ſhould by any be imputed for a defect, though it were indeed none of my deſign. I ſay theſe things are long ſince performed to our hands; but there is none of theſe (that I at leaſt know of, and are come to my peruſal) who have taken any conſiderable pains how to direct and encourage us in the culture of foreſt-trees, the grand defect of this nation, beſides ſome ſmall ſprinklings to be met withal in Gervas Markham, Old Tuſſer, and, of foreigners, the Country-farm, long ſince tranſlated out of French, and by no means ſuitable to our clime and country: Neither have any of theſe proceeded after my method, and ſo particularly, in raiſing, planting, dreſſing, governing, &c. or ſo ſedulouſly made it their buſineſs to ſpecify the mechanical uſes of the ſeveral kinds, as I have done, which was hitherto a great Deſideratum, and in which the reader will likewiſe find ſome things altogether new and inſtructive; together with directions and encouragements for the propagation of ſome foreign curioſities of ornament and uſe, which were hitherto neglected. If I have upon occaſion preſumed to ſay any thing concerning their medicinal properties, it has been modeſtly and frugally, and with chief, if not only, reſpect to the poor Woodman, whom none, I preſume, will envy, that, living far from the Phyſician, he ſhould, in caſe of neceſſity, conſult the Reverend Druid, his Oaks *, and his Elm, Birch, or Elder, for a ſhort breath, a green wound, or a ſore leg, caſualties incident to his hard labour. Theſe are the chief particulars of this enſuing work, and what it pretends hitherto of ſingular, in which, let me be permitted to ſay, there is ſufficient for inſtruction, and more than is extant in any collection whatſoever (abſit verbo invidia) in this way, and upon this ſubject, abſtracting things practicable, of ſolid uſe, and material, from the oſtentation and impertinences of divers writers, who, receiving all that came to hand on truſt, with a view to ſwell their monſtrous volumes, have hitherto impoſed upon the credulous world, without conſcience or

* Ne Silvæ quidem horridiorque naturæ facies, Medicinis carent, ſacra illa parente rerum omnium, nuſquam non remedia diſponente homini ut Medicina fieret etiam ſolitudo ipſa. Hinc nata Medicina. Hæc ſola naturæ placuerat eſſe remedia parata vulgo, inventu facilia, ac ſine impendio, & quibus vivimus Plin. lib. xxiv. cap. i.

honeſty. I will not exaſperate the adorers of our antient and late naturaliſts, by repeating what our Verulam has juſtly pronounced concerning their rhapſodies, becauſe I likewiſe honour their painful endeavours, and am obliged to them for much of that I know; nor will I, with ſome, reproach Pliny, Porta, Cardan, Mizaldus, Curſius, and many others of great name, whoſe writings I have diligently conſulted, becauſe of the knowledge they have imparted to me on this occaſion; but I muſt deplore the time which is, for the moſt part, ſo miſerably loſt in purſuit of their ſpeculations, where they treat upon this argument. The world is now adviſed, and, bleſſed be God, infinitely redeemed from that baſe and ſervile ſubmiſſion of our nobleſt faculties to their blind traditions. This, you will be apt to ſay, is a haughty period; but whilſt I affirm it of the paſt, it juſtifies and does honour to the preſent induſtry of our age; and of which there cannot be a greater and more emulous inſtance than the paſſion of his Majeſty to encourage his ſubjects, and of the Royal Society, his Majeſty's Foundation, who receive and promote his dictates, in all that is laudable and truly emolumental of this nature.

It is not therefore that I here preſume to inſtruct him in the management of that great and auguſt enterprize of reſolving to plant and repair his ample foreſts, and other magazines of timber, for the benefit of his royal navy, and the glory of his kingdoms; but to preſent to his Sacred Majeſty, and to the world, what advices I have received from others, obſerved myſelf, and moſt induſtriouſly collected from a ſtudious propenſity to ſerve as one of the leaſt intelligences in the ample orb of our illuſtrious ſociety, and in a work ſo neceſſary and important.

And now, ſince I have mentioned the Society, give me leave, worthy reader, as a member of that body which has been the chief promoter of this enſuing work, to vindicate (as I ſtand obliged) that aſſembly, and conſequently the honour of his Majeſty and the Nation, in a particular which concerns it, though, in appearance, a little foreign to the preſent ſubject.

I will not ſay that all which I have written in the ſeveral paragraphs of this treatiſe is new; but that there are very many new and uſeful things and obſervations, (without inſiſting on the methods only) not hitherto delivered by any author, and ſo freely communicated, I hope

will ſufficiently appear. It is not therefore in behalf of any particular which concerns myſelf that I have been induced to enlarge this preface; but, by taking this occaſion, to encounter the unſufferable boldneſs or ambition of ſome perſons, as well ſtrangers as others, arrogating to themſelves the being inventors of divers new and uſeful experiments, juſtly attributable to ſeveral members of the Royal Society *.

So far has that aſſembly been from affecting glory, that they ſeem rather to have declined their due; not as aſhamed of ſo numerous and fair an offspring; but as abundantly ſatisfied that, after all the hard meaſure and virulent reproaches they had ſuſtained for endeavouring, by united attempts, and at their own charges, to improve real philoſophy, they had, from time to time, cultivated that province in ſo many uſeful and profitable inſtances as are already publiſhed to the world, and will be eaſily aſſerted to their authors before all equitable judges.

This being the ſole inducement of publiſhing this apology, it may not perhaps ſeem unſeaſonable to diſabuſe ſome, otherwiſe, well-meaning people, who, led away and perverted by the noiſe of a few ignorant and comical buffoons, (whoſe malevolence or impertinences entitle them to nothing that is truly great and venerable) are, with an inſolence ſuitable to their underſtanding, ſtill crying out, and aſking, What have the Society done?

Now, as nothing leſs than miracles (nor thoſe, unleſs God ſhould every day repeat them at the call of theſe extravagants) will convince ſome perſons

* Conſult the Hiſtory of the Royal Society and their regiſters.——The laws of motion, and the geometrical ſtreightening of Curve-lines, were firſt found out by Sir Chriſtopher Wren and Mr. Thomas Neile.——The equated iſocrone motion of the weight of a circular pendulum in a paraboloeid, for the regulating of clocks, and the improving pocket-watches, by ſprings applied to the balance, were firſt invented and demonſtrated to this Society by Dr. Hooke; together with all thoſe new and uſeful inſtruments, contrivances, and experiments, mathematical and phyſical, publiſhed in his poſthumous works by the moſt accompliſhed Mr. Waller, Secretary to the Royal Society; and ſince, thoſe of the incomparably learned Sir Iſaac Newton, now Preſident of the Royal Society; Mr. Halley, the worthy Profeſſor of Geometry in the Univerſity of Oxford; Dr. Grew, and ſeveral more, whoſe works and uſeful inventions ſufficiently celebrate their merits. I do not mention the Barometer, to which might be added the prodigious effects of the Speculum Uſtorium, ſurpaſſing what the French confidently, or rather audaciouſly, pretend to; nor the other admirable inventions, injurioufly arrogated by ſtrangers, though due of right to Engliſhmen, and members of this Society; for it is not the buſineſs of this preface to enumerate all, though it was neceſſary to touch on ſome inſtances.

of the moſt rational and divine truths, already ſo often and extraordinarily eſtabliſhed, ſo neither will any thing ſatisfy theſe unreaſonable men, but the production of the Philoſopher's Stone and Great Elixir; which yet were they poſſeſſors of, they would conſume upon their luxury and vanity.

It is not therefore to gratify theſe magnificent fops, whoſe talents reach but to the adjuſting of their perukes, courting a Miſs, or, at the fartheſt, writing a ſmutty or ſcurrilous libel, which they would have to paſs for genuine wit, that I concern myſelf in theſe papers; but, as well in honour of our Royal Founder, as the nation, to aſſert what by other countries has been ſurreptitiouſly arrogated, and by which they not only value themſelves abroad, but, prevailing on the modeſty of that induſtrious aſſembly, ſeek the deference of thoſe who, whilſt it remains ſtill ſilent, do not ſo clearly diſcern this glorious plumage to be purely aſcititious, and not a feather of their own.——But ſtill, what have they done?

Thoſe who perfectly comprehend the ſcope and end of that noble inſtitution, which is to improve natural knowledge, and enlarge the empire of operative philoſophy, not by an abolition of the old, but by the real effects of the experimental, collecting, examining, and improving their ſcattered phænomena, with a view to eſtabliſh even the received methods and principles of the ſchools, as far as were conſiſtent with truth and matter of fact, thought it long enough that the world had been impoſed upon by that notional and formal way of delivering divers ſyſtems and bodies of philoſophy, falſely ſo called, beyond which there was no more country to diſcover; which being brought to the teſt and trial, vapours all away in fume and empty ſound.

This ſtructure then being thus ruinous and crazy, it is obvious what they were to do; even the ſame which ſkilful architects do every day before us, when pulling down the decayed and ſinking wall to erect a better and more ſubſtantial in its place; they not only take down the old, reject the uſeleſs and decayed, but ſever ſuch materials as are ſolid, and will ſerve again; bring new ones in, prepare and frame a model ſuitable to ſo magnificent a deſign: This Solomon did in order to the building of the material temple, and this is here to be purſued in the intellectual: Nay, here was abundance of rubbiſh to be cleared, that the area might be free; and then was the foundation to be deeply ſearched, the materials accurately

examined, ſquared, and adjuſted before it could be laid: Nor was this the labour of a few; leſs than a much longer time, more coſt and encouragement than any which the Society has yet met withal, could not in reaſon be ſufficient effectually to go through ſo chargeable a work, and highly neceſſary.

A long time it was they had been ſurveying the decays of what was ready now to drop in pieces. Whatever ſhew the outſide made with a noiſe of elements and qualities, occult and evident, abhorrence of vacuum, ſympathies, antipathies, ſubſtantial forms, and prime matter courting form; epicycles, Ptolemean hypotheſis, magiſterial definitions, peremptory maxims, ſpeculative and poſitive doctrines, and alti-ſonant phraſes, with a thouſand other precarious and unintelligible notions (all which they have been turning over, to ſee if they could find any thing ſincere and uſeful among this pedantic rubbiſh, but in vain) here was nothing material, nothing of moment, mathematical or mechanical, and which had not been miſerably ſophiſticated, on which to lay the ſtreſs; nothing in a manner whereby any farther progreſs could be made, for the raiſing and ennobling the dignity of mankind in the ſublimeſt operations of the rational faculty, by clearing the obſcurities, and healing the defects of moſt of the phyſiological hypotheſis, repugnant, as they hitherto ſeemed to be, to the principles of real knowledge and experience.

Now, although it was neither in their hopes or in their proſpect to conſummate a deſign requiring ſo mighty aids, environed as they have been with theſe prejudices, yet have they not deſiſted from the enterprize; but rather than ſo noble and illuſtrious an undertaking ſhould not proceed for want of ſome generous and induſtrious ſpirits to promote the work, they have themſelves ſubmitted to thoſe mean employments of digging in the very quarry; yea, even of making brick where there was no ſtraw but what they gleaned, and lay diſperſed up and down; nor did they think their pains yet ill beſtowed, if, through the aſſiduous labour and a train of continual experiments, they might at laſt furniſh, and leave ſolid and uncorrupt materials to a ſucceeding and more grateful age, for the building up a body of real and ſubſtantial philoſophy, which ſhould never ſuccumb to time, but with the ruins of nature, and the world itſelf.

In order to this, how many, and almoſt innumerable, have been their trials and experiments, through the large and ample field both of art and

nature! we call our journals, regiſters, correſpondence, and tranſactions to witneſs; and may, with modeſty, provoke all our ſyſtematical methodiſts, natural hiſtorians, and pretenders, hitherto extant from the beginning of letters to this period, to ſhew us ſo ample, ſo worthy, and ſo uſeful a collection. It is a fatality and an injury to be deplored, that thoſe who give us hard words, will not firſt vouchafe impartially to examine theſe particulars, ſince all ingenuous ſpirits could not but be abundantly ſatisfied, that this illuſtrious aſſembly has not met ſo many years purely for ſpeculation only; though I take even that to be no ignoble culture of the mind, or time miſpent, for perſons who have ſo few friends and ſlender obligations to thoſe who ſhould patronize and encourage them: But they have aimed at greater things, and greater things produced. By emancipating and freeing themſelves from the tyranny of opinion, deluſory and fallacious ſhews, they receive nothing upon truſt, but bring all things to the Lydian touch, make them paſs the fire, the anvil, and the file, till they come forth perfectly repurged, and of conſiſtence. They are not haſty in pronouncing from a ſingle, or incompetent number of experiments, the ecſtatic Ἐυρηκα, and offer hecatombs; but, after the moſt diligent ſcrutiny, and by degrees, and wary inductions honeſtly and faithfully made, record the truth and event of trials, and tranſmit them to poſterity. They reſort not immediately to general propoſitions upon every ſpecious appearance, but ſtay for light and information from particulars, and make report *de facto*, and as ſenſe informs them. They reject no ſect of philoſophers, no mechanic helps, except no perſons of men; but chearfully embracing all, cull out of all, and alone retain what abides the teſt; that, from a plentiful and well-furniſhed magazine of true experiments, they may in time advance to ſolemn and eſtabliſhed axioms, general rules and maxims; and a ſtructure may indeed lift up its head, ſuch as may ſtand the ſhock of time, and render a ſolid account of the phænomena and effects of nature, the aſpectable works of God, and their combinations, ſo as, by cauſes and effects, certain and uſeful conſequences may be deduced: Therefore they do not fill their papers with tranſcripts out of rhapſodiſts, mountebanks, and compilers of receipts and ſecrets, to the loſs of oil and labour; but, as it were, eviſcerating nature, diſcloſing the reſorts and ſprings of motion, have collected innumerable experiments, hiſtories, and diſcourſes, and brought in ſpecimens for the improvement of Aſtronomy, Geography, Navigation, Opticks; all the parts of Agriculture, the Garden and the Foreſt; Anatomy of Plants and Animals; Mines and Ores;

Meaſures and Equations of Time by accurate Pendulums and other Motions; Hydro and Hygro-Staticks, divers Engines, Powers, and Automata; with innumerable more luciferous particulars ſubſervient to human life, of which Dr. Glanvil has given an ample and ingenious account in his learned eſſay, and ſince in the poſthumous works of Dr. Hooke, lately publiſhed by the moſt obliging Mr. Waller, already mentioned.

This is, Reader, what they have done, and they are but part of the materials which the ſociety have hitherto amaſſed and prepared for this great and illuſtrious work; not to paſs over an infinity of ſolitary and looſe experiments ſubſidiary to it, gathered at no ſmall pains and coſt: for ſo have they hitherto borne the burden and heat of the day alone; ſapping and mining to lay the foundation deep, and raiſe a ſuperſtructure to be one day perfected by the joint endeavours of thoſe who ſhall, in a kinder age, have little elſe to do, but the putting and cementing of the parts together, which, to collect and fit, have coſt them ſo much ſolicitude and care. Solomon indeed built the glorious Temple, but it was David provided the materials: Did men in thoſe days inſolently aſk, What he had done in all the time of that tedious preparation? I beſeech you, what obligation has the Royal Society to render an account of their proceedings to any who are not of the body, eſpecially when they carry on the work at their own expence amidſt ſo many contradictions? It is an evil ſpirit, and an evil age, which, having ſadly debauched the minds of men, ſeeks with induſtry to blaſt and undermine all attempts and endeavours that ſignify to the illuſtration of truth, the diſcovery of impoſture, and its ſandy foundation.

"Thoſe who come," ſays the Noble Verulam, "to enquire after knowledge, with a mind to ſcorn, ſhall be ſure to find matter for their humour, but none for their inſtruction." Would men bring light of invention, and not fire-brands of contradiction, knowledge would infinitely increaſe.
Nehem. ii. 19. Theſe are the Sanballats and Horonites who diſturb our men upon the wall; but let us riſe up and build, and be no more diſcouraged. It is impoſſible to conceive how ſo honeſt and worthy a deſign ſhould have found ſo few promoters, and ſo cold a welcome in a nation whoſe eyes are ſo wide open. We ſee how greedily the French and other ſtrangers embrace and cultivate the deſign: What ſumptuous buildings, well furniſhed obſervatories, ample appointments, ſalaries, and accommodations have they erected to carry on the work, whilſt we live precariouſly, and ſpin the web

out of our own bowels! Indeed, we have had the honour to be the firſt who led the way and given the ferment, which, like a train, has taken fire and warmed the regions all about us. This glory, doubtleſs, ſhall none take from us; but, whilſt they flouriſh ſo abroad, we want the ſpirit that ſhould diffuſe it here at home, and give progreſs to ſo hopeful a beginning: But, as we ſaid, the enemy of mankind has done us this deſpite; it is his intereſt to impeach, in any ſort, whatever oppoſes his dominion (which is to lead and ſettle men in errors, as well in arts and natural knowledge as in religion) and therefore would be glad the world ſhould ſtill be groping after both. It is he that ſets the buffoons and empty ſycophants to turn all that is great and virtuous into raillery and deriſion: It is therefore to encounter theſe, that, like thoſe reſolute builders, whilſt we employ one hand in the work, we, with the other, are obliged to hold our weapon till ſome bold and gallant genius deliver us, and raiſe the ſiege. Neh. iv. 17.

How great a name would ſuch a benefactor eſtabliſh! What a conſtellation would he make! How gloriouſly would he ſhine! For mine own part, religiouſly I profeſs it, were I not a perſon, who (whilſt I ſtood expecting when others more worthy and able than myſelf ſhould have ſnatched the opportunity of ſignalizing a work worthy of immortality) had long ſince given hoſtages to fortune, and ſo put myſelf out of a capacity of ſhewing my affection to a deſign ſo glorious, I would not only moſt chearfully have contributed towards the freeing the Society from the ſtraits it has ſo long ſtruggled under, but ſacrificed all my ſecular intereſts in their ſervice. That glory, however, is reſerved for the gallant hero, whoever he be, who, truly weighing the noble and univerſal conſequence of ſo high an enterprize, ſhall at laſt free it of theſe reproaches, and either ſet it above the reach of envy, or convert it to emulation.

This were indeed to conſult an honeſt fame, and to embalm the memory of a greater name than any has yet appeared amongſt all the benefactors of the diſputing ſects. Let it ſuffice to affirm, that, next to the propagation of our moſt Holy Faith and its appendants, (nor can his Majeſty or the Nation build their fame on a more laſting or a more glorious monument, the propagation of learning and uſeful arts having always ſurvived the triumphs of the proudeſt conquerors and ſpillers of blood) Princes have been more renowned for their civility to Arts and Letters, than to all their ſanguinary victories, ſubduing provinces, and making thoſe brutiſh deſolations in the

world to feed a ſalvage and vile ambition. Witneſs thou great Alexander, and ye the Ptolemys, Cæſars, Charlemagne, Francis the Firſt, the Coſimos, Fredericks, Alphonſos, and the reſt of learned Princes: Since, when all the pomp and noiſe is ended, they are thoſe little things in black, whom now in ſcorn you term Philoſophers and Fops, to whom you muſt be obliged for making your names outlaſt the pyramids, whoſe founders are as unknown as the heads of the Nile, either becauſe they deſerved no memory for their virtues, or had none to tranſmit them or their actions to poſterity.

Is not our Royal Founder already panegyrized by all the Univerſities, Academiſts, Learned Perſons, divers Princes, Ambaſſadors, and illuſtrious Men from abroad? Witneſs the many accurate treatiſes and volumes on the moſt curious and uſeful ſubjects, medicinal, mathematical, and mechanical, dedicated to his Majeſty as Founder, to the Preſident, and to the Society, by the greateſt Wits and moſt profoundly knowing of the European world, celebrating their inſtitution and proceedings: Witneſs the daily ſubmiſſions and ſolemn appeals of the moſt learned ſtrangers to their ſuffrages, as to the moſt able, candid, and impartial judges: Witneſs the letters and correſpondences from moſt parts of the habitable earth, Eaſt and Weſt-Indies, and almoſt from pole to pole, beſides what they have received from the very mouths of divers Profeſſors, Public Miniſters, great Travellers, Noblemen, and Perſons of the higheſt Quality, who have not only frequented the aſſembly, but deſired to be incorporated and aſcribed into their number; ſo little has his Majeſty or the Kingdom been diminiſhed in their reputation by the Royal Society, to the reproach of our ſordid adverſaries.

Never had the Republick of Letters ſo learned and univerſal a correſpondence as has been procured and promoted by this Society alone, as not only the caſual tranſactions of ſeveral years, filled with inſtances of the moſt curious and uſeful obſervations, make appear; but, as I ſaid, the many nuncupatory epiſtles to be ſeen in the fronts of ſo many learned Volumes. There it is you will find Charles the Second placed among the Heroes and Demi-Gods, for his patrociny and protection. There you will ſee the numerous congratulations of the moſt learned foreigners, celebrating the happineſs of their inſtitution; and that whilſt other nations are ſtill benighted under the duſky cloud, ſuch a refulgent beam ſhould give

day to this bleſſed iſle: And, certainly, it is not to be ſuppoſed that all theſe learned perſons, of ſo many and divers intereſts as well as countries, ſhould ſpeak and write thus out of flattery, much leſs out of ignorance, being men of the moſt refined univerſal knowledge as well as ingenuity; but I ſhould never end were I to purſue this fruitful topic.

I have but one word more to add to conciliate the favour and eſteem of our own Univerſities to an Aſſembly of Gentlemen, who, from them, acknowledge to have derived all their abilities for theſe laudable undertakings: Whatever is ſhining in them of moſt chriſtian, moral, and otherwiſe conſpicuous, they confeſs as derived from that ſource and fountain, to which, on all occaſions, they are not only ready to pay the tribute and obſequiouſneſs of humble ſervants, but of Sons and dutiful Alumni. There is nothing verily which they more deſire than a fair and mutual correſpondence between ſo near relations, and that they may be perpetually flouriſhing and fruitful in bringing forth, as they ſtill do, ſupplies to Church and State in all its great capacities *. Finally, that they would regard the Royal Society as a Colony of their own planting, and augure its ſucceſs: And if, in theſe labours and arduous attempts, ſeveral inventions of preſent uſe and ſervice to mankind (either detecting errors, illuſtrating and aſſerting truths, or propagating knowledge in natural things, and the viſible works of God) have been diſcovered; as they envy not the communicating them to the world, ſo ſhould they be wanting to the Society, and to the honour of divers learned and ingenious Perſons, who are the ſoul and body of it, not to vindicate them from the ambitious plagiary, the inſults of ſcoffers and injurious men. Certainly, perſons of right noble and ſubacted principles, who are lovers of their country, ſhould be otherwiſe affected, and rather ſtrive to encourage and promote endeavours tending to ſo generous a deſign, than decry it; eſpecially when it coſts them nothing but their civility to ſo many obliging perſons, tho' they ſhould hitherto have

* Since this Epiſtle was firſt written and publiſhed, the Univerſity of Oxford has inſtituted and erected a Society for the promoting of Natural and Experimental Knowledge in concert with the Royal Society, with which they keep a mutual correſpondence. This I mention, for that ſome malevolents had ſo far endeavoured to poſſeſs divers Members of the Univerſity, as if the Society deſigned nothing leſs than the undermining of that and other illuſtrious Academies, and which indeed ſo far prevailed, as to breed a real jealouſy for ſome conſiderable time; but as this was never in the thoughts of the Society, which had ever the Univerſities in the greateſt veneration, ſo the innocency and uſefulneſs of its inſtitution has at length diſabuſed them, vindicated their proceedings, diſſipated all ſurmiſes, and, in fine, produced an ingenuous, friendly, and candid union and correſpondence between them.

entertained them but with ſome innocent diverſions. To conclude, we envy none their dues; nay, we gratefully acknowledge any lights which we receive either from home or from abroad; we celebrate and record the names of thoſe who give them amongſt our benefactors; recommend them to the public; and what we thus freely give, we hope as freely to receive.

Thus have I endeavoured to vindicate the Royal Society from ſome aſperſions and encroachments it hitherto has ſuffered, and ſhewed under what weights and preſſure this palm does ſtill emerge; and if, for all this I fall ſhort of my attempt, I ſhall yet have this ſatisfaction, that tho' I derive no glory from my own abilities, ſenſible of my great defects, I ſhall yet deſerve their pardon for my zeal to its proſperity.

ΦΙΛΟΣΟΦΙΑΣ ἐπιθυμεῖς; παρασκευάζε αὐτόθεν, ὡς καταγελασθησόμενος, ὡς καταμωκησομένων σε πολλῶν ὡς ἐρέντων, ὅτι ἄφνω φιλόσοφος ἡμῖν ἐπανελήλυθε, καὶ πόθεν ἡμῖν αὕτη ἡ ὀφρύς; σὺ δὲ ὀφρὺν μὲν μὴ σχῇς· τῶν δὲ βελτίσων σοι φαινομένων ἕτως ἔχε, ὡς ὑπὸ τοῦ Θεοῦ τεταγμένος εἰς ταύτην τὴν τάξιν· μέμνησο δὲ ὅτι ἐὰν μὲν ἐμμείνῃς τοῖς αὐτοῖς, οἱ καταγελῶντές σε πρότερον, ἔτοί σε ὕστερον θαυμάσονται· ἐὰν δὲ ἡττηθῇς αὐτῶν, διπλοῦν προσλήψῃ καταγέλωτα. EPICTETUS.

TRANSLATION.

If you reſolve to make wiſdom and virtue the ſtudy and buſineſs of your life, you muſt be ſure to arm yourſelf before-hand againſt all the inconveniencies and diſcouragements that are like to attend this reſolution. Imagine that you ſhall meet with many ſcoffs, and much deriſion; and that people will upbraid you with turning philoſopher all on the ſudden; and aſk in ſcorn, What is the meaning of all this affected gravity, and theſe diſdainful looks? But be not you affected, or ſupercilious, only ſtick cloſe to whatever you are in your judgment convinced is virtuous and becoming; and conſider this as your proper ſtation, aſſigned you by God, which you muſt not quit upon any terms. And remember, That if you perſevere in goodneſs, thoſe very men, who derided you at firſt, will afterwards turn your admirers: But if you give way to their reproaches, and are vanquiſhed by them, you will then render yourſelf doubly and moſt deſervedly ridiculous. STANHOPE.

TO THE READER.

" Some men, like Lucian in Religion, ſeek, by their Wit, to traduce
" and expoſe uſeful things, becauſe, to arrive at them, they converſe with
" mean experiments; but thoſe who deſpiſe to be employed in ordinary
" and common matters, never arrive at ſolid perfection in Experimental
" Knowledge." LORD VERULAM.

J. EVELYN.

ADVERTISEMENT.

AS I have frequently inſerted divers hiſtorical and other paſſages, appoſite and agreeable to the ſubject, abſtaining from a number more which I might have added, let it be remembered, that I did not altogether compile this work for the ſake of our ordinary Ruſticks, meer Foreſters and Woodmen, but for the benefit and diverſion of Gentlemen and perſons of Quality, who often refreſh themſelves in theſe agreeable toils of Planting and Gardening; for the reſt, I may perhaps in ſome places have made uſe of here and there a word, not as yet ſo familiar to every reader; but none, that I know of, which are not ſufficiently explained by the context and diſcourſe. That this may yet be no prejudice to the meaner capacities, let them read for

Ablaqueation, laying bare the roots.
Amputation, cutting quite off.
Arborator, pruner, or one that has care of the trees.
Avenue, the principal walk to the front of the houſe or ſeat.
Bulbs, round, or onion-ſhaped roots.
Calcine, burn to aſhes.
Compoſt, dung.
Conſervatory, green-houſe to keep choice plants in.
Contr' Eſpalier, a paliſade, or pole-hedge.
Coronary Garden, flower-garden.
Culinary, belonging to the kitchen, roots, ſalading, &c.
Culture, dreſſing.
Decorticate, to ſtrip off the bark.
Emuſcation, cleanſing it of the moſs.
Eſculent, roots, ſalads, &c. fit to eat.
Eſpaliers, Wall-fruit trees.
Exoticks, outlandiſh, rare and choice.
Fermentation, working.

Fibrous, ſtringy.
Frondation, ſtripping of leaves and boughs.
Heterogeneous, repugnant.
Homogeneous, agreeable.
Hyemation, protection in winter.
Ichnography, ground-plot.
Inoculation, budding.
Inciſion, graffing.
Inſolation, expoſing to the ſun.
Interlucation, thinning and diſbranching of a wood.
Irrigation, watering.
Laboratory, ſtill-houſe.
Letation, dung.
Lixivium, lee.
Mural, belonging to the wall.
Olitory, belonging to the kitchen-garden.
Paliſade, pole-hedge.
Parterre, flower-garden, or knots.
Perennial, continuing all the year.
Quincunx, trees ſet like the cinque-point of a dye.
Rectify, re-diſtil.
Seminary, nurſery.
Stercoration, dunging.
Tonſile, that which may be ſhorn or clipped.
Topiary-Works, the clipping, cutting, and forming of hedges, &c. into figures and works.
Vernal, belonging to the ſpring.

The reſt are obvious.

ΕΙΣ ΤΗΝ ΤΟΥ ΠΑΤΡΟΣ

ΔΕΝΔΡΟΛΟΓΙΑΝ.

Ὕμνήσω φρονίμοιο πατρὸς μελέεσσιν ἐπαίνους,
Ὑμνήσω ἐπέεσσιν ἀριστεύοντα γεωργῶν.
Οὐρανίην τανυφῆς ἀρετὴν δρυὸς αὐτὸς ἔγραψεν,
Καὶ ποταπῶν γενεὴν δένδρων κατὰ δάσκιον ὕλην.
Ἀθανάτων κύδιστος ἦεν νεφεληγερέτα Ζεὺς,
Ἔσχεν δὴ δένδροιο φίλαις ὡραπίδεσσιν ἔελδωρ,
Φύλλοις τ' ἀμβροσίοις θαλερᾶς δρυὸς ἐστεφάνωτο.
Ἀγλιακῶν ὃς ἄριστος ἦεν θεοείκελος ἀνὴρ,
Ἰσορίην δένδρων τέλεσεν φρεσὶ κυδαλίμοισι,
Ὑλογενὴς, κηπουρὸς, ὑπείροχος, ὃς μέγ' ὄνειαρ
Ἀνδράσιν ἐσσομένοις καλὰ γαίην πολυβότειραν,
Νησί τε ποντοπόροισι βαρυγδούποιο θαλάσσης.

JO. EVELYN, Fil.

SILVA:

OR, A

DISCOURSE

OF

FOREST-TREES,

AND

The Propagation of TIMBER in his Majeſty's Dominions, &c.

Tuque ades, inceptumque una decurre laborem,
O decus, ô famæ merito pars maxima noſtræ,
CAROLIDE, pelagoque volans da vela patenti:
Da facilem curſum, atque audacibus annue cœptis;
Ignaroſque viæ mecum miſeratus agreſtes,
Ingredere, & votis jam nunc aſſueſce vocari.

THE INTRODUCTION.

1. SINCE there is nothing which ſeems more fatally to threaten a weakening, if not a diſſolution, of the ſtrength of this famous and flouriſhing nation, than the ſenſible and notorious decay of her wooden walls, when, either through time, negligence, or other accident, the preſent navy ſhall be worn out and impaired; it has been a very worthy and ſeaſonable advertiſement in the honourable the principal Officers and Commiſſioners, what they have lately ſuggeſted to this illuſtrious Society for the timely prevention and redreſs of this intolerable defect. For it has not been the late increaſe of ſhipping alone, the multiplication of glaſs-works, iron-furnaces, and the like, from whence this impolitic diminution of our timber has proceeded; but from the diſproportionate ſpreading of tillage, cauſed through that prodigious havoc made by ſuch

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as lately profeſſing themſelves againſt root and branch (either to be reimburſed their holy purchaſes, or for ſome other ſordid reſpect) were tempted not only to fell and cut down, but utterly to extirpate, demoliſh, and raze, as it were, all thoſe many goodly woods and foreſts, which our more prudent anceſtors left ſtanding for the ornament and ſervice of their country. And this devaſtation is now become ſo epidemical, that unleſs ſome favourable expedient offer itſelf, and a way be ſeriouſly and ſpeedily reſolved upon, for a future ſtore, one of the moſt glorious and conſiderable bulwarks of this nation will, within a ſhort time, be totally wanting to it *.

NOTES.

* In order to trace the hiſtory of the decay of our foreſt-trees, it will be neceſſary to remark, that the firſt attack made upon them, of any material conſequence, was in the 27th year of the reign of Henry VIII. when that monarch ſeized upon the church-lands, and converted them, together with their woods, to his own uſe. Ruinous as ſuch an attempt might appear at firſt, it did not bring with it any very pernicious conſequences, as the whole kingdom, at that early period, was plentifully ſtocked with all kinds of timber-trees, eſpecially the Oak. During the Civil War, which broke out in 1642, and all the time of the Inter-regnum, the Royal Foreſts, as well as the Woods of the Nobility and Gentry, ſuffered a great calamity, inſomuch that many extenſive foreſts had, in a few years, hardly any memorial left of their exiſtence but their names. From that period to the preſent, there is ſome reaſon to apprehend that the perſons appointed to the ſuperintendence of the Royal Foreſts and Chaſes have not ſtrictly and diligently attended to their charge, otherwiſe the nation would not at this day have reaſon to complain of the want of Oak, for the purpoſes of encreaſing and repairing the Royal Navy. This loſs, however, would not have operated ſo ſeverely, had the principal Nobility and Gentry been as ſolicitous to plant, as to cut down their woods. But this reflection ſhould be made with ſome degree of limitation, as ſeveral thouſand acres of waſte land have, within theſe twenty years, been planted for the benefit of the riſing generation. The Society of Arts, &c. eſtabliſhed in London in the year 1754, have greatly contributed, by their honorary and pecuniary premiums, to reſtore the ſpirit for planting, and I flatter myſelf that a republication of Mr. Evelyn's Silva will alſo contribute to that moſt deſirable end. Tuſſer, a verſifier in the reign of Henry the Eighth, complains, at that early period, "that men were more ſtudious to cut down than to plant trees:" and as this author is often quoted by Mr. Evelyn, it will be proper to remark that his book is entitled *Five hundred Points of Huſbandry*, and is printed in black letter. It is written in quatrains, or ſtanzas, of four verſes each, and contains more lines than Virgil's Georgics. The firſt edition was publiſhed in 1562. There are other editions in 1604, and 1672, in Octavo; alſo in 1710, and 1743, with notes and obſervations.——Every thing that has a tendency towards the raiſing and diffuſing a ſpirit for planting, is highly meritorious; and as our wooden

2. To attain now a ſpontaneous ſupply of theſe decayed materials (which is the vulgar and natural way) would coſt (beſides the incloſure) ſome entire ages repoſe of the plow *, though bread indeed require our firſt care: therefore the moſt expeditious and obvious method would doubtleſs be one of theſe two ways, ſowing or planting. But, firſt, it will be requiſite to agree upon the ſpecies; as what trees are likely to be of greateſt uſe, and the fitteſt to be cultivated; and then, to conſider of the manner how it may be beſt effected. Truly, the waſte and deſtruction of our woods has been ſo univerſal, that I conceive nothing leſs than an univerſal plantation of all the ſorts of trees will ſupply, and well encounter the defect; and therefore I ſhall here adventure to ſpeak ſomething in general of them all; though I chiefly inſiſt upon the propagation of ſuch only as ſeem to be the moſt wanting and ſerviceable to the end propoſed.

* Patricius, L. vii. De Reg. pub.

3. And firſt, by Trees here, I conſider principally for the *Genus generaliſſimum*, ſuch lignous and woody plants as are hard of ſubſtance, procere of ſtature; that are thick and ſolid, and ſtiffly adhere to the ground on which they ſtand †. Theſe we ſhall divide into the greater and more

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walls have been eſteemed, for many ages paſt, the bulwarks of this nation, we may hope, from the goodneſs of our AUGUST SOVEREIGN, that he will ſet an example to the Nobility and Men of large poſſeſſions, by ordering his waſtes to be planted with Timber-Trees, eſpecially the Oak:

——————————— nouriſh there
Thoſe ſapling Oaks, which at Britannia's call,
May heave their trunks mature into the main,
And float the bulwarks of her liberty. MASON.

The wants of the nation call for this ſupply. How many thouſand acres of waſte land are there in this kingdom, that at this preſent time produce nothing, but may be profitably improved by planting! Did Men of large poſſeſſions but rightly conſider this, they would carefully look over their eſtates, ſearch out every uſeleſs bog, and plant it with Poplars or other aquatics. They would examine allthe waſte grounds, and ſet apart ſome for the Cottagers, and apply the moſt barren and uſeleſs for plantations. Was ſuch a generous ſpirit to prevail, we ſhould hear few perſons complaining that their antient Common-rights are invaded, and that their extreme neceſſities have obliged them to emigrate to countries far leſs hoſpitable than their own.

† A Tree is defined to be a perennial plant, which riſes to a very great height, with a ſimple, woody, and durable Stem, or Trunk. By theſe characters Trees are di-

INTROD. ceduous, fruticant and ſhrubby; feras and wild; or more civilized and domeſtic; and ſuch as are ſative and hortenſial ſubalternate to the other; but of which I give only a touch, diſtributing the reſt into theſe two claſſes, the dry and the aquatic; both of them applicable to the ſame civil uſes of building, utenſils, ornament, and fuel; for to dip into their

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ſtinguiſhed, with great accuracy, from Herbs, whoſe ſtems are frequently compound, herbaceous, or ſucculent, and die down to the root every year. It is evident from the characters juſt enumerated, that all trees are perennial. Herbs are either annual, that is, of one year's duration; or biennial, of two; thoſe only are perennial, whoſe roots, not periſhing with the ſtems, continue a long time under the ſurface of the ground, and put forth a new ſtem every year.—Upon theſe obvious and ſtriking differences was founded the very antient diviſion of vegetables into herbs and trees; though, perhaps, that diſtinction was principally ſuggeſted by the difference of ſize and duration of the plants in queſtion. Be that as it may, the diviſion has been eſteemed ſo natural and ſpontaneous, that, from the time of Ariſtotle and Theophraſtus to the preſent age, it has obtained a principal place in almoſt every ſyſtem, except that of Linnæus, which mixes herbs, ſhrubs, and trees promiſcuouſly together. But this is evidently to preſerve the harmony of his ſyſtem, which is ſolely founded on the fructification of every individual Genus and Species. We may therefore eaſily diſcover the reaſon of Linnæus's overlooking every other idea that did not fall in with his own, and of his affirming that, in this particular, Nature has put no limits between trees and ſhrubs.—Among the celebrated names in botany, which have retained the antient diſtinction, are numbered Cæſalpinus, the father of ſyſtematic botany; Moriſon, Hermannus, Chriſtopher Knaut, Boerhaave, Ray, Pontedera, and Tournefort. The latter, rather than omit a diviſion, through cuſtom become neceſſary, choſe to hurt the elegance and uniformity of his plan; and, in fact, ſpun out into twenty-two claſſes, what, without ſuch diviſion, might have been eaſily compriſed in ſeventeen.——On the oppoſite ſide are ranged Rivinus, Chriſtian Knaut, Linnæus, Ludwig, and other names of leſs note. The diſtinction into Trees and Shrubs, though of equal antiquity, is neither ſo obvious, nor are its limits ſo accurately aſcertained. In fact, of the numerous characteriſtic differences which have been ſuggeſted by botanical writers, not one is perfectly ſatisfactory. To ſay with Tournefort, that trees are univerſally taller than ſhrubs, is, in effect, ſaying nothing, unleſs a certain fixed, immutable ſtandard were previouſly eſtabliſhed. Beſides, every thing reſpecting dimenſion is ſo variable in its nature, and depends ſo much upon difference of climate, ſoil, and management, that were a ſtandard of this kind attempted to be eſtabliſhed, the greateſt confuſion would enſue; and the ſame plant in different countries, and even in oppoſite ſoils in the ſame country, would receive different appellations, according as it exceeded, or came ſhort of, the given ſtandard.——Thus the *ricinus*, or palma chriſti; the dwarf roſebay, *rhododendron*; the ſtrawberry-tree, *arbutus*; and ſeveral others, which grow to the ſize of very large trees in warm climates, are, in this country, equalled and even exceeded in

medicinal virtues is none of my province, though I ſometimes glance at them with due ſubmiſſion, and in few inſtances *. INTROD.

4. Among the Dry, I eſteem the more principal and ſolid to be the Oak, Elm, Beech, Aſh, Cheſnut, Walnut, &c. the leſs principal, the Service, Maple, Lime-tree, Horn-beam, Quick-beam, Birch, Haſel, &c. together with all their ſubalternate and ſeveral kinds:

Sed neque quàm multæ ſpecies, nec nomina quæ ſint,
Eſt numerus; neque enim numero comprendere refert:
Quem qui ſcire velit, Libyci velit æquoris idem
Diſcere, quam multæ Zephyro turbentur arenæ. VIRG. Georg. ii.

I paſs the reſt, whoſe ev'ry race and name,
And kinds, are leſs material to my theme:
Which who would learn, as ſoon may tell the Sands,
Driv'n by the weſtern winds on Lybian Lands:

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height by many of our ſmalleſt ſhrubs.——The difference of ſoil and culture in the ſame climate, produces a like diverſity in dimenſion. Thus, to take an example from herbaceous vegetables, the marigold, which, in a fat and moiſt earth, riſes two feet high, ſcarce exceeds the ſame number of inches in a dry and gravelly ſoil.——The learned Dr. Alſton, in his *Tyrocinium Botanicum*, wiſhes to conſider the diſtinction into trees and ſhrubs, as a true natural diſtinction, and endeavours to trace its foundation in the internal ſtructure of the plants themſelves. All trees, ſays he, whether they bear buds or not, are covered with two barks, the outer and inner, called by the botaniſts *cortex* and *liber*. Shrubs differ from herbaceous vegetables in the duration of their ſtems; from trees in the nature of their covering, which is not a bark, but a cuticle or ſimple ſkin.—This thought is ingenious; but the fact on which it depends, is not ſufficiently aſcertained.—The farther diſtinction into ſhrubs and under-ſhrubs, which is exceedingly arbitrary and indeterminate, was firſt ſuggeſted by Cluſius, in a work intitled, *Rariores & Exoticæ Plantæ*, publiſhed in 1576; and afterwards adopted by Cæſalpinus, and others.

* In this Mr. Evelyn imitates Virgil, who, in a few inſtances, gives the medicinal virtues of trees and ſhrubs.

Ipſa ingens arbos, faciemque ſimillima Lauro:
Et, ſi non alium late jactaret odorem,
Laurus erat: folia haud ullis labentia ventis:
Flos apprima tenax: animas & olentia Medi
Ora fovent illo, & ſenibus medicantur anhelis. GEORG. lib ii. l. 131.

INTROD. 5. Of the Aquatical, I reckon the Poplars, Aſp, Alder, Willow, Sallow, Oſier, &c. Then I ſhall add a word or two for the encouragement of the planting of fruit-trees, together with ſome leſs vulgar, but no leſs uſeful trees, which, as yet, are not endenizoned amongſt us, or, at leaſt, not much taken notice of: and in purſuance hereof, I ſhall obſerve this order: Firſt, to ſhew how they are to be raiſed, and then cultivated. By raiſing, I underſtand the ſeed and the ſoil; by culture, the planting, fencing, watering, dreſſing, pruning, and cutting; of all which briefly.

6. And firſt for their raiſing: Some there are,

Spring of themſelves, unforc'd by human care ——nullis hominum cogentibus, ipſæ Sponte ſua veniunt——

Specified according to the various diſpoſition of the air and ſoil;

Some from their ſeeds ariſe, Pars autem poſito ſurgunt de ſemine.

As the Oak, Cheſnut, Aſh, &c.

Some to thick groves from their own roots do ſpring, Pullulat ab radice aliis denſiſſima ſylva.

As the Elm, Alder, &c. And there are others

Grow without root, Nil radicis egent——

As Willows, and all the vimineous kinds, which are raiſed by ſets only.

Theſe ways firſt Nature gave. Hos Natura modos primùm dedit——

And that immortal Poet has ſo elegantly and comprehenſibly deſcribed, as I cannot paſs.

Principio arboribus varia eſt Natura creandis.
Namque aliæ, nullis hominum cogentibus, ipſæ
Sponte ſua veniunt, campoſque & flumina late
Curva tenent: ut molle ſiler, lentæque geniſtæ,
Populus & glaucâ canentia fronde ſalicta.
Pars autem poſito ſurgunt de ſemine: ut altæ
Caſtaneæ, nemorumque Jovi quæ maxima frondet
Æſculus, atque habitæ Graiis oracula quercus.
Pullulat ab radice aliis denſiſſima ſylva:
Ut ceraſis, ulmiſque: etiam Parnaſſia laurus
Parva ſub ingenti matris ſe ſubjicit umbrâ.
Hos Natura modos primùm dedit: his genus omne
Sylvarum fruticumque viret, nemorumque ſacrorum.
Sunt alii, quos ipſe viâ ſibi repperit uſus. VIRG. Georg. ii.

Some trees their birth to bounteous Nature owe:
For ſome without the pains of planting grow.
With Oſiers thus the banks of brooks abound,
Sprung from the wat'ry genius of the ground:
From the ſame principles grey Willows come;
Herculean Poplar, and the tender Broom.
But ſome from ſeeds inclos'd in earth ariſe:
For thus the maſt-ful Cheſnut mates the ſkies.
Hence riſe the branching Beech, and vocal Oak,
Where Jove of old oraculouſly ſpoke.
Some from the root a riſing wood diſcloſe;
Thus Elms, and thus the ſalvage Cherry grows.
Thus the green Bays, that binds the Poet's brows,
Shoots, and is ſhelter'd by the mother's boughs.
Theſe ways of planting Nature did ordain,
For Trees and Shrubs, and all the Sylvan reign.
Others there are, by late experience found:

For thus we ſee there are more ways to the wood than one, and ſhe has furniſhed us with variety of expedients.

7. And here we might fall into a deep philoſophical reſearch, whether the Earth itſelf in ſome place thereof or other, even without ſeed, branch, or root, &c. would produce every kind of vegetable, as it manifeſtly does divers ſorts of graſs and plants? viz. the Trefoil, or Clover, in ſucculent land; in dry ground, May and Ragweeds; in the very moiſt, Ros-ſolis, Argentina, Flags, &c. and in the very barren, Fern, Broom and Heath, &c. So Virgil notes ſterile places for the Pitch-tree; we our wet and uliginous, for the Birch, Alder, &c. The more lofty, poor, and perflatile, for Yew, Juniper, Box, and the like. And we read in the natural hiſtories of divers countries, that the Cedar, Palmetos, Queen-Pines, Ebony, Nutmeg, Cinnamon, &c. for Trees; the Tulip, Hyacinth, Crocus, &c. for Flowers; are ſometimes, and in ſome regions, Aborigines, deſcended immediately from the genius of the ſoils, climate, ſun, ſhade, air, winds, water, nitrous ſalts, rocks, banks, ſhores, and (like the Negroes-heads in the Barbadoes) as ſome imagine, even without ſeed, or at leaſt any perceptible rudiment. Let it not then be imputed an impertinent digreſſion, if, upon this occa-

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ſion of ſpontaneous and æquivocal productions *, we mention how that inveterate diſpute, which has exerciſed ſo many Naturaliſts and Philoſophers (about Miſleto) has lately been decided by an evident experiment, and the teſtimony of the moſt curious and learned Botaniſts, by the ſeeds of that excreſcence; which being inſerted into an hole made in the bark of the White Poplar, produces the plant which has hitherto raiſed ſo many years controverſy. (See Mr. *Ray's Hiſt. Plant.* p. 1583; and *Appendix*, p. 1918†.)

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* It is no wonder that ſome ſhould ſuppoſe Vegetables capable of being produced without their parent ſeeds, when it was once held as a reaſonable doctrine that Animals, ſuch as Maggots, Flies, &c. might be generated by Putrefaction. We are taught by glaſſes that all Animals, however minute, are organized; and we have convincing proofs that they are alſo regulated by the ſame general laws that direct the œconomy of the larger Animals. Could Putrefaction give birth to an organized Animal, the order of nature, eſtabliſhed at the beginning of the world, would by this time have been overturned, and ſcarce one ſpecies of Animals or Plants which were the objects of Solomon's attention, would at this day be viſible upon the face of the earth. A Horſe might as well ſpring from a dunghill as a Fly, and the brawny Oak might as readily be produced by a ferment in the earth, as the Trefoils and Ragweed deſcribed by Mr. Evelyn. Before putreſaction can produce the greater wonder, it muſt be able to produce the leſſer; and who ever ſaw a repeating watch, or a muſical clock, created by the ferment of a dunghill!

——————————— nil ſemine egeret:
E mare primum homines, e terra poſſet oriri
Squammigerûm genus, & volucres; erumpere cœlo
Armenta, atque aliæ pecudes: genus omne ferarum
Incerto partu culta, ac deſerta teneret:
Nec fructus iidem arboribus conſtare ſolerent,
Sed mutarentur: ferre omnes omnia poſſent. LUCRET. lib. i. l. 162.

This doctrine of ſpontaneous, or equivocal, generation was originally invented in Egypt, with a view to ſolve the phænomenon of the numerous ſwarms of flies and inſects that were generated upon the ſurface of the mud left by the waters of the Nile.

† The Miſleto, inſtead of rooting and growing in the earth, like other plants, fixes itſelf and takes root on the branches of trees. It ſpreads out with many branches and forms a large buſh. It is commonly found upon the White Thorn, the Apple, the Crab, the Aſh, and Maple, but is rarely ſeen upon the Oak; which laſt kind, as Mr. Ray well obſerves, was chiefly eſteemed in medicine, owing to the ſuperſtitious honours which the antient Druids of this iſland paid to that plant when gathered there. This is a paraſitical plant, and is always produced from ſeed. Some of the antients called it an excreſcence on the tree, growing without ſeed; which opinion is now fully confuted by a number of experiments. It is the opinion of ſome, that it is pro-

But, after all this, there are who ſuppoſe ſome previous ſeminal diſpoſition to be lurking, and diſperſed in every part of the earth (in what moleculæ, or ſubtile contexture, they cannot diſcover) which though haply not at firſt ſo perfect as the maturer ſeeds of their after peculiar plants; yet ſuch as are fit for the ſun and influences to operate on, till they have prepared, diſcuſſed, and excited the ſeminal and prolific virtue to exert itſelf and awake out of ſleep, in which they lie as in their cauſes, freeing themſelves from thoſe impediments which hindered their ſpecification and nativity. This conception the learned Gaſſendus would illuſtrate by the latent fire in flints, which never betrays itſelf till it be forced out by colliſion: but which yet, methinks, does not ſo fully enlighten this hypotheſis, which we only mention: for the deſign of this diſcourſe is not to perſuade men to ſit ſtill, and let nature work alone, but to aid and aſſiſt her as much as

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pagated by the Miſleto Thruſh, which, feeding upon the berries, leaves the ſeeds with its dung upon the branches of the reſpective trees where the plant is commonly found. Others ſay, that as the berries are extremely glutinous, the ſeeds frequently ſtick to the beaks of thoſe birds, which being rubbed off upon the branches of trees, they become inoculated, as it were, and take root. In the ſame manner the Miſleto may be propagated by art; for if the berries, when full ripe, be rubbed upon the ſmooth part of the bark of almoſt any tree, they will adhere cloſely, and produce plants the following winter. In the garden now belonging to Mr. James Collins of Knareſbrough, are many large plants of the Miſleto, produced in this manner upon the Dwarf Apple-tree. Of Miſleto we have only one ſpecies growing in Europe, viz. Viſcum (album) foliis lanceolatis obtuſis, caule dichotomo, ſpicis axillaribus, Lin. Sp. Plant. 1023. *Miſleto with blunt ſpear-ſhaped leaves, forked ſtalks, and ſpikes of flowers riſing from the wings of the ſtalks.* Viſcum baccis albis, C. B. P. 423. *Miſleto with white berries.*

The gathering of the Miſleto made a part of the religious worſhip of the Druids. When the end of the year approached, they marched with great ſolemnity to gather it, in order to preſent it to Jupiter, inviting all the world to aſſiſt at the ceremony in theſe words: "The new year is at hand, gather the Miſleto." The ſacrifices being ready, the Prieſt aſcended the Oak, and with a golden hook cut off the Miſleto, which was received in a white garment ſpread for that purpoſe. This part of the ceremony being ended, the victims, two white bulls that never had been yoked, were brought forth and offered up to the Deity, with prayers that he would proſper thoſe to whom he had given ſo precious a boon. Of the Miſleto, thus gathered, they made a potion which they adminiſtered as an antidote to all poiſons, and uſed as a remedy to prevent ſterility. Beſides the Miſleto, the Druids ritually gathered the Selago, or *Firr Club-moſs*, and the Samolus, or *Round-leaved Water Pimpernell*, both which they applied to medicinal purpoſes. It may here be remarked that the Druids, in ſeveral of their religious cere-

INTROD. they are able, from ſeeds and plants already perfected, and qualified for more ſpeedy propagation. It is not in any ſort my meaning throughout this diſcourſe, as if (where I ſpeak of ſpontaneous productions) I believed that any vegetables raiſed themſelves without ſome prediſpoſed qualified ſeed or principle: But by *ſpontaneous*, I underſtand ſuch trees and plants as were not ſown or cultivated by human induſtry; as moſt of our foreſt-trees never were, and yet had their original from perfect ſeeds. And if I think the ſame of all animals, even to the minuteſt worm and inſect, there are ſo many learned perſons and experiments to juſtify it, that I need ſay no more. Moſt ingenious, in the mean time, is what ſome, upon an accurate and narrow gueſs, have not feared to pronounce; namely,

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monies, had a delicacy ſuperior to moſt of the Antients; for in gathering the Miſleto they always uſed a golden hook; whereas, among other nations, a hook of braſs was thought good enough for the like purpoſes:

Falcibus & meſſæ ad Lunam quæruntur ahenis
Pubentes herbæ, ——————— ÆN. lib. iv.
Partim ſuccidit curvamine falcis aënae. OVID. MET. lib. vii.

In Sophocles, Medea is deſcribed as gathering her magic herbs with a brazen hook, and afterwards putting their juice into brazen pots.——Virgil, with great poetical elegance, compares the golden bough to the Miſleto, on account of its being an adventitious plant, and of a golden colour:

Quale ſolet Sylvis brumali frigore viſcum
Fronde virere nova, quod non ſua ſeminat arbos,
Et croceo fœtu teretes circumdare truncos.
Talis erat ſpecies auri frondentis opacâ
Ilice, ſic leni crepitabat bractea vento. ÆN. lib. vi. l. 205.

The ſtory of the golden bough ſhews that the Druids were not ſingular in attributing great magical powers to ſcarce and beautiful plants, ritually gathered, and offered to the Gods:

Hoc ſibi pulchra ſuum ferri Proſerpina munus
Inſtituit. ——— *Ib.* l. 142.
Ergo alte veſtiga oculis, & rite repertum
Carpe manu; ——— *Ib.* l. 145.

And here it may not be improper to remark, that antient cuſtoms are a conſiderable time before they can be effaced, even in countries that have experienced the calamities of conqueſt; for in France, as Keyſler informs us, ſomething of the Druidical ceremonies, relative to the Miſleto, ſubſiſts in the province of Aquitain. "In Aquitania "quotannis Prid. Kal. Jan. pueri atque adoleſcentes vicos villaſque obeunt, carmine "ſtipem petentes, ſibique, atque aliis pro voto, in exordio novi anni acclamantes, "AU GUY! L'AN NEUF!"

that all planting by ſeed was but a kind of inoculation; and propagation by cyons and ſprouts, but a ſubterranean graffing. And upon this account I am the more willing to aſſent, that, in removing of wild trees taken out of incumbered places, (ſo it be performed with all due circumſtances) there may happen conſiderable improvements; ſince, as there is ſomething in ſuper-graffing, or the repetition of graffing, for the enlargement and melioration of fruit, ſo there may be alſo in a careful removal; eſpecially the tree being of a kind apt to dilate its roots, and taken whilſt thoſe roots may be ſafely and intirely transferred; and likewiſe, becauſe it is preſumed that moſt trees, propagated by ſeeds, emit a principal root very deep into the earth, which frequently extracting but a coarſer nutriment (though it may haply yield a cloſe and firmer timber) is not yet ſo apt to ſhoot and ſpread, as what are by removal deprived of that root; and by being more impregnate with the ſun, dews, and heavenly influences near the ſurface, enabled to produce larger, more delicate, and better taſted fruit; ſuppoſing nuts, maſt, or berries; for we would not go out of our foreſt for inſtances: and yet even in theſe deſcents of the tap-root, it ſometimes penetrating to a vein of ſome rich marl or other mould, the extraordinary flouriſhing and expedition of growth will ſoon give notice of it. But to make ſome trial of this, it were no difficult matter, when one plants a nurſery or grove, to experiment what the earth, as far as the roots are like to reach, will advance and diſcover to us.

8. In the mean time, it has been ſtiffly controverted by ſome, whether were better to raiſe trees for timber and the like uſes, from their ſeeds and firſt rudiments; or to tranſplant ſuch as we find have either raiſed themſelves from their ſeeds, or ſprung from the mother-roots. Now that to produce them immediately of the ſeed is the better way, theſe reaſons may ſeem to evince.

Firſt, Becauſe they take ſooneſt. *Secondly*, Becauſe they make the ſtraiteſt and moſt uninform ſhoot. *Thirdly*, Becauſe they will neither require ſtaking nor watering, which are two very conſiderable articles. And, *laſtly*, For that all tranſplanting, (though it much improves fruit-trees) unleſs they are taken up the firſt year or two, is a conſiderable impediment to the growth of foreſt-trees: And though it be true, that divers of thoſe which are found in woods, eſpecially Oaklings, young Beeches, Aſh, and ſome others, ſpring from the ſelf-ſown Maſt and Keys;

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Creſcentique adimunt fœtus, uruntque ferentem. GEOR. lib. ii.

Which checks their growth, and makes their bodies pine.

Nor can their roots expand, and ſpread themſelves as they would do, if they were ſown, or had been planted in a more open, free, and ingenuous ſoil. And that this is ſo, I do affirm upon experience, that an Acorn, ſown by hand in a Nurſery, or ground where it may be free from theſe incumbrances, ſhall in two or three years outſtrip a plant of twice that age, which has either been ſelf-ſown in the woods, or removed, unleſs it fortune, by ſome favourable accident, to have been ſcattered into a more natural, penetrable, and better qualified place; but this diſproportion is yet infinitely more remarkable in the Pine and the Walnut-tree, where the Nut, ſet into the ground, does uſually overtake a tree of ten years growth which was planted at the ſame inſtant, and this is a ſecret ſo generally miſrepreſented by moſt of thoſe who have treated of theſe ſorts of trees, that I could not ſuffer it to paſs over without a particular remark; ſo as the noble Poet (with pardon for receding from ſo venerable authority) might be miſtaken, when he delivers this obſervation as univerſal, to the prejudice of ſowing, and raiſing woods from their rudiments:

Jam, quæ ſeminibus jactis ſe ſuſtulit arbos,
Tarda venit, ſeris factura nepotibus umbram. GEOR. lib. ii.

Trees, which from ſcatter'd ſeeds to ſpring are made,
Come ſlowly on, for our grand-children's ſhade.

And, indeed, I know divers are of this opinion; and poſſibly in ſome luckier ſoils, and where extraordinary care is had in tranſplanting and removing cumbrances, &c. there may be reaſon for it: But I affirm it ὡς ἐπὶ πολύ, and for the moſt part, and find I have the ſuffrage of another no inelegant Poet, if not in a full aſſent to my aſſertion, yet in the choice of my procedure for their perfection.

——— Quamvis ipſa de ſtirpe parentis
Pullulet, & tenues tollat ſe quercus in auras,
Aut mutata ſolo, ramis exſultet opacis;
Forma tamen nemoris non ſit mihi gratior ulla,
Quam quod per campos, poſito de ſemine, crevit.
Et quamquam ſit agro prælongum tempus inerti
Ducendum, ac tardæ ſurgant de ſemine quercus,
His tamen, his longe veniunt felicius umbræ.
Nam certum eſt de glande ſatas radicibus imis
Altius in terram per ſe deſcendere plantas:
Majoreſque adeo in cœlum profundere ramos.
Seu quod dediſcant mutatam ſemina matrem,
Degeneremque ferant alieno ex ubere prolem:
Sive quod ipſa ſibi cognatæ inoleſcere terræ
Glans primo melius paulatim aſſuevit ab ortu.

RAPIN. *Hort.*

——— Though ſuckers which the ſtock repair,
Will with thick branches crowd the empty air;
Or the Ground-Oak tranſplanted, boughs may ſhoot;
Yet no ſuch grove does with my fancy ſuit,
As what from Acorns ſet on even rows,
In open fields at their due diſtance grows.
What though your ground long time muſt fallow lie,
And Seedling-Oaks yield but a ſlow ſupply?
No walks elſe can be for like beauty prais'd:
For certain 'tis that Plants from Acorns rais'd,
As to the centre deeper fibres ſpread,
So to the Zenith more advance their head:
Be it that Plants for natural moiſture pine,
And as expos'd, at change of ſoil decline;
Or that the Acorn with its native mould,
Does thrive and ſpread, and firm alliance hold.

DENDROLOGIA.

BOOK THE FIRST.

CHAP. I.

Of the Earth, Soil, Seed, Air, and Water.

BOOK I. EARTH.

1. IT is not my intention here to ſpeak of Earth, as one of the common reputed Elements, of which I have long ſince publiſhed an ample account in an expreſs treatiſe *, which I deſire my reader to peruſe, ſince it might well commute for the total omiſſion of this chapter, did not method ſeem to require ſomething briefly to be ſaid; which firſt, as to that of Earth, we ſhall need at preſent to penetrate no deeper into her boſom, than, after paring off the turf, ſcarrifying the upper mould, and digging convenient pits and trenches, not far from the natural ſurface, without diſturbing the ſeveral ſtrata and remoter layers, whether of clay, chalk, gravel, ſand, or other ſucceſſive layers, and concrets foſſil (though all of them uſeful ſometimes, and agreeable to our foreſters) though few of them what one would chooſe before the under turf, black, brown, gray, and light, and breaking into ſhort clods, and without any diſagreeable ſcent, and with ſome mixture of marl or loam, but not clammy; of which I have particularly ſpoken in that treatiſe.

SOIL.

2. In the mean time, this of the Soil (which I think is a more proper term for compoſts) or mould rather, being of greater importance for the raiſing, planting, and propagation of trees in general, muſt at no hand be neglected; and is therefore, on all occaſions, mentioned in almoſt every chapter of our enſuing diſcourſe. I ſhall therefore not need to aſſign it any part, when I have affirmed in general, that moſt timber-trees grow

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* This treatiſe is intitled TERRA, or a PHILOSOPHICAL account of EARTH, and was publiſhed at the requeſt of the Royal Society in the year 1679. It accompanies all the editions of the SILVA from that date.

and proſper well in any tolerable land which will produce corn or rye, and which is not in exceſs ſtony, in which nevertheleſs there are ſome trees delight, or altogether clay, which few or none do naturally affect; and yet the Oak is ſeen to proſper in it, for its toughneſs preferred before any other by many workmen; tho' of all Soils the cow-paſture doth certainly exceed, be it for what purpoſe ſoever of planting wood. Rather therefore we ſhould take notice how many great wits † and ingenious perſons, who have leiſure and faculty, are in pain for improvements of their heaths and barren hills, cold and ſtarving places, which cauſes them to be neglected and deſpaired of; whilſt they flatter their hopes and vain expectations with fructifying liquors *, chymical menſtruums, and ſuch vaſt

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† At the time when Mr. Evelyn wrote, and long before, wit and wiſdom were conſidered as ſynonimous terms:

——then might I by councell help my trouth, which by mine own witt I am not able agaynſte ſuch a prepared thynge. *Sir* THOMAS WYAT's *Defence*.

* The ſteeping of ſeeds in prolific liquors is not of modern invention. The Romans, who were good huſbandmen, have left us ſeveral receipts for ſteeping of grain, in order to increaſe the powers of vegetation. In England, France, Italy, and in all countries where agriculture has been attended to, we ſee a variety of liquors recommended for the ſame purpoſe.——Good nouriſhment has ever been obſerved to add ſtrength and vigour to all vegetables. Hence it was natural to ſuppoſe that, by filling the veſſels of the grain with nouriſhing liquors, the germ, with its roots, would be invigorated. How far this reaſoning is founded upon juſt principles, remains to be examined. For my part, I am not an advocate for ſteeps. All my experiments demonſtrate that they have no inherent virtue. I have more than once ſown the ſame ſeed, ſteeped and unſteeped, and though all other circumſtances were minutely alike, yet I never could obſerve the leaſt difference in the growth of the crop. I confeſs that when the light ſeeds are ſkimmed off, as in the operation of brining, the crop will be improved, and diſeaſes prevented: but theſe advantages proceed from the goodneſs of the grain ſown, and not from any prolific virtue of the ſteep. I am happy in not being ſingular in my objection to ſteeps. Many rational farmers have been induced to quit their prejudices, and are now convinced from their own trials, that there is no dependence upon prolific liquors, though ever ſo well recommended. Some people have been hardy enough to perſuade themſelves, that the tillering of wheat may be ſo much increaſed by invigorating the grain, that only one half of the ſeed will be required.——Duhamel, one of the moſt accurate of the experimental huſbandmen, and a moſt excellent philoſopher, ſpeaks, in the ſtrongeſt terms, againſt the practice of ſteeping, ſo far as it ſuppoſes an impregnation of vegetative particles. I ſhall not here repeat his experiments. I ſhall only obſerve, that they are ſuch as any farmer

BOOK I.

conceptions; in the mean time that one may ſhew them as heathy and hopeleſs grounds, and barren hills as any in England, that do now bear, or lately have borne woods, groves, and copſes, which yield the owners more wealth than the richeſt and moſt opulent wheat-lands: And if it be objected, that it is ſo long a day before theſe Plantations can afford that gain; the Brabant Nurſeries, and divers Home-plantations of induſtrious perſons, are ſufficient to convince the gain-ſayer. And when, by this huſbandry, a few Acorns ſhall have ſupplied the neighbouring regions with young ſtocks and trees, the reſidue will become groves, and copſes of infinite delight and ſatisfaction to the Planters. Beſides, we daily ſee what coarſe lands will bear theſe Rocks (ſuppoſe them Oaks, Walnuts, Cheſnuts, Pines, Fir, Aſh, Wild Pears, Crabs, &c.) and ſome of them (as for inſtance, the Pear and the Fir, or Pine) ſtrike their roots through the

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may make; they are plain and concluſive.——Good ſeed, when ſown upon land in excellent tilth, will always produce a plentiful crop. The beſt of grain impregnated to the full with the moſt approved ſteep, and ſown upon land indifferently prepared, will for ever balk the hopes of the farmer. I do not preſume to condemn the practice in poſitive terms, becauſe my experiments are againſt it. Other experiments may be oppoſed to mine. I ſhall therefore reſt the whole upon a deſcription of what happens to grain after it has been committed to the earth, and hope that I ſhall be able to explain myſelf with ſufficient perſpicuity. The ſubject is curious, and the diſcuſſion of it not very difficult.

A grain of wheat contains, within two capſules, a conſiderable ſhare of flour, which, when melted down into a liquor by the watery juices of the earth, conſtitutes the nouriſhment of the tender plant, until its roots are grown ſufficiently large to abſorb their own food. Here is evidently a ſtore-houſe of nutriment. And from that idea it is plain that the plumpeſt grains are the moſt eligible for ſeed. Some imagine that poor grains may be ſo impregnated, as to make them equal in vegetative force to the largeſt. I have more than once made the experiment, and am convinced that plump ſeeds, of the ſame heap, are ſuperior in goodneſs to the ſmall ones, though ever ſo carefully macerated. The farina being the food of the embryo plant, it follows that the vegetative powers will be increaſed in proportion to its quantity.—I have ſprouted all kinds of grain in a variety of ſteeps, and can aſſure the farmer, that the radicle and germ never appeared ſo vigorous and healthy, as when ſprouted by elementary water: an argument that the ſeed requires no aſſiſtance. The ſame ſteep, when applied in quantities to the ſoil, will undoubtedly invigorate the roots, and nouriſh the plant; but in that caſe it operates in common with other manures, and loſes the idea of a ſteep. As nitre, ſea-ſalt, and lime, are generally added to the ſteeps, I have conſtantly obſerved that their application rendered the radicle and germ yellow and ſickly: a plain proof that they were unnaturally uſed at that ſeaſon. Did the farina

rougheſt and moſt impenetrable rocks and clefts of ſtone itſelf; and others require not any rich or pinguid, but very moderate Soil; eſpecially, if committed to it in ſeeds, which allies them to their mother and nurſe without renitency or regret: And then conſidering what aſſiſtances a little care in eaſing and ſtirring of the ground about them, for a few years, does afford them; what cannot a ſtrong plow, a winter mellowing, and ſummer heats, incorporated with the pregnant turf, or a ſlight aſſiſtance of lime, loam, ſand, rotten compoſt, diſcreetly mixed (as the caſe may require) perform even in the moſt unnatural and obſtinate ſoil? And in ſuch places where antiently woods have grown, but are now unkind to them, the fault is to be reformed by this care; and chiefly by a ſedulous extirpation of the old remainders of roots, and latent ſtumps, which, by their muſtineſs, and other pernicious qualities, ſour the ground, and poiſon the conception: And herewith let me put in this note, that even an over-rich and pinguid compoſition is by no means the proper bed either for Seminary or Nurſery, whilſt even the natural Soil itſelf does frequently diſcover and point beſt to the particular ſpecies, though ſome are for all places alike; nor ſhould the Earth be yet perpetually cropped with the ſame, or other ſeeds, without due repoſe, but lie ſome time fallow to

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need any additional particles, it might be ſuppoſed that broth made of the fleſh of animals would be the moſt agreeable. To be ſatisfied of that, I ſprouted ſome grains in beef broth, and an equal number in ſimple water. The reſult was, that the radicle and germ produced by the broth were weaker, and leſs healthy, than the others ſprouted by the pure element. They were afterwards ſown, but I could perceive no apparent difference in the crop. As no invigorating or fructifying liquor, however pompouſly introduced, has ever ſtood the teſt of fair and correct experiment, we may venture to lay it down as an eſtabliſhed truth, that *plump ſeed clear of weeds, and land well prepared to receive it, will ſeldom diſappoint the expectations of the farmer*; and upon theſe he ſhould rely for the goodneſs of his crop.—In this ſhort diſſertation upon ſteeps, or fructifying liquors, it ſhould be remarked, that I have drawn my concluſions from experiments made upon grain, inſtead of the ſeeds of foreſt-trees, in full confidence that the general laws of vegetation are the ſame in every kind of ſeed, from the almoſt *imperceptible* ſeed of the Orchis to the Acorn of the Sovereign Oak. And I had this additional reaſon, that, in the courſe of a few months, I could make my obſervations upon the different ſtages of vegetation, from the firſt appearance of the germ to the final perfection of the plant.

Book I. receive the influence of heaven *, according to good huſbandry. But I ſhall ſay no more of theſe particulars at this time, becauſe the reſt are ſprinkled over this whole work in their due places; wherefore we haſten to the following title, namely, the choice and ordering of the ſeeds.

3. Chooſe your ſeed of that which is perfectly mature, ponderous, and ſound; commonly that which is eaſily ſhaken from the boughs, or gathered about November, immediately upon its ſpontaneous fall, or taken from the tops and ſummities of the faireſt and ſoundeſt trees, is beſt, and does,

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* The ingenious Dr. Prieſtley, in a paper preſented to the Royal Society in 1773, on different kinds of air, among many other intereſting and important diſcoveries, proves to a demonſtration that the putrid air ariſing from dunghills and the perſpiration of animals is not only abſorbed by vegetables, but alſo adds to their increaſe. As I preſume that this diſcovery was made prior to the Doctor's publication, I ſhall beg leave to produce my claim to it; at the ſame time acknowledging myſelf no ways intitled to ſhare with him the honour of his experimental proofs.—In January 1769, being engaged in an inveſtigation of the nature of the FOOD of vegetables, with a view to eſtabliſh a theory of Agriculture, I diſcovered that there muſt be ſome ſecret property in the air, which reſtored worn-out lands to their former fertility; and as I could not perſuade myſelf that it aroſe from the univerſal acid, ſo much talked of, I was led, by a chain of reaſoning and ſome few experiments, to conclude that it muſt proceed from putrid exhalations, firſt generated upon the ſurface of the earth, then raiſed into the atmoſphere, and afterwards brought down by rain: In this manner I ſuppoſed that the INFLUENCE of HEAVEN, as Mr. Evelyn well expreſſes it, was obtained. —— Having fully ſatisfied myſelf that worn-out lands were thus reſtored, I went a ſtep further, and concluded, as I thought, with certainty, that all plants, by their leaves as well as by their roots, imbibed theſe putrid vapours for their food. And here I beg leave to remark, that I do not mean to ſay that plants have no other nutriment, as it may be proved to a demonſtration that many things give them food without having undergone the putrid ferment.——March 8, 1769, I read a memoir upon this curious ſubject before the York Agriculture Society, being the day of their inſtitution; and in June following I publiſhed it in a ſmall Duodecimo Volume of 66 pages, under the title of GEORGICAL ESSAYS. The favourable reception that this work met with induced me to republiſh it in 1770, with conſiderable additions. The words I refer to are theſe: "During the "ſummer months the atmoſphere is full of putrid exhalations ariſing from the ſteam of "dunghills, the perſpiration of animals and ſmoak. Every ſhower brings down theſe "oleaginous * particles for the nouriſhment of plants." *Georg. Eſſays, vol.* I. *p.* 27.

In a ſubſequent volume the thought is ſtill ſtronger: "It is pleaſing to obſerve how "the diſſolution of one body is neceſſary for the life and increaſe of another. All "nature is in motion. In conſequence of the putrid fermentation that is every where "carried on, a quantity of vegetable nutriment aſcends into the atmoſphere. Summer

* The word *Oleaginous* is chiefly applied to ſmoak, and correſponds with the theory of the food of plants, as deſcribed in the eſſays here quoted.

for the moſt part, direct to the proper ſeaſon of interring, &c. according to inſtitution. CHAP. I.

At ſpecimen ſationis, & inſitionis origo
Ipſa fuit rerum primum natura creatrix:
Arboribus quoniam baccæ, glandeſque caducæ
Tempeſtiva dabant pullorum examina ſubter. LUCRET. l. v.

Nature herſelf, who all created firſt,
Invented ſowing, and the wild plants nurſt:
When maſt and berries from the trees did drop,
Succeeded under by a numerous crop.

Yet this is to be conſidered, that if the place you ſow in be too cold for an autumnal ſemination, your Acorns, Maſt, and other Seeds may be

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"ſhowers return much of it again; but part falls into the ſea and is loſt: To this we "may add the animal and vegetable ſubſtances conſumed on board of ſhips, all of "which are buried in the ocean. The induſtry of man reſtores them to the earth; and "we may preſume that the fiſh taken from the ſea leave a balance in favour of man-"kind: Thus providence, with the moſt conſummate wiſdom, keeps up the neceſſary "rotation of things." *Georg. Eſſays, vol.* II. *p.* 135.

So far I had conſidered this putrid nutriment as abſorbed by the *roots* of plants; but the ingenious experiments of Dr. Prieſtley refer to the abſorption of the putrid air by the *leaves* of plants. *That* I had alſo remarked in a variety of places.——"Hitherto I "have conſidered plants as nouriſhed by their roots; I ſhall now take a view of them "as nouriſhed by their leaves. An attention to this part of the vegetable ſyſtem is "eſſentially neceſſary to the rational farmer. Vegetables that have a ſucculent leaf, "ſuch as vetches, peaſe, beans, and buck-wheat, draw a great part of their nouriſhment "from the air, and on that account impoveriſh the ſoil leſs than wheat, oats, barley, "or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing "plants, and conſequently impoveriſhers of the ſoil; but the former leſs ſo than the "latter, owing to the greater ſucculency of its leaf. The leaves of all kinds of grain "are ſucculent for a time, during which period the plants take little from the earth; "but as ſoon as the ear begins to be formed, they loſe their ſoftneſs and diminiſh in "their attractive power. The radical fibres are then more vigorouſly employed in "extracting the oily particles of the earth for the nouriſhment of the ſeed. Such, I "apprehend, is the courſe of nature." *Ibid. vol.* I. *p.* 57.

"In order that we may have a diſtinct view of the motion of the ſap, it will be neceſ-"ſary to reflect, that the root, ſtem, branches, and leaves are conſtructed in the ſame

Book I. prepared for the vernal, by being barrelled or potted up in moiſt ſand, or earth, ſtratum ſuper ſtratum, during the winter; at the expiration whereof you will find them ſprouted; and being committed to the earth, with a tender hand, as apt to take as if they had been ſown with the moſt early, nay, with great advantage: By this means too, they have eſcaped the vermin, which are prodigious devourers of winter ſowing, and will not

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" manner. Sallows, willows, vines, and moſt ſhrubs, will grow in an inverted ſtate, " with their tops downward in the earth. Dr. Bradley deſcribes the manner of invert- " ing a young cherry-tree, the roots of which will put forth leaves, and the branches " become roots. Hence it is obvious that the nutritive matter may be conveyed as " well by the leaves as the roots, their vaſcular ſtructure being the very ſame."

Georg. Eſſays, vol. I. *p.* 168.

" During the heat of a ſummer's day, all plants perſpire freely from the pores of their " leaves and bark. At that time the juices are highly rarefied. The diameters of " the Tracheæ, or air-veſſels, are enlarged, ſo as to preſs upon and ſtraiten the veſſels " that carry the ſap. In conſequence of which their juices, not being able to eſcape " by the roots, are preſſed upward, where there is the leaſt reſiſtance, and perſpire off " the excrementitious parts by the leaves and top-branches, in the form of vapour. " When the ſolar heat declines, the Tracheæ are contracted. The ſap-veſſels are " enlarged, and the ſap ſinks down in the manner of the ſpirits of a thermometer. In " conſequence of this change, the capillary veſſels of the leaves and top-branches " become empty: Being ſurrounded with the humid vapours of the evening, they fill " themſelves from the known laws of attraction, and ſend down the new-acquired " juices to be mixed with thoſe that are more elaborated. As ſoon as the ſun has " altered the temperature of the air, the Tracheæ become again diſtended, and the " ſap-veſſels are ſtraitned. The ſame cauſe always produces the ſame effect; and this " alternate aſcent and deſcent, through the ſame ſyſtem of veſſels, continues as long " as the plant ſurvives." *Ibid. vol.* I. *p.* 170.

" Air is to be found in every portion of earth; and as it always contains a ſolution of " the volatile parts of animal and vegetable ſubſtances, we ſhould be careful to keep our " ſtiff ſoils as open as poſſible to its influence. It paſſes, both in its active and fixed " ſtate, into the abſorbent veſſels of the root, and, mixing with the juices of the plant, " circulates through every part. Dr. Hales, in his ſtatical experiments upon the vine, " diſcovered it aſcending with the ſap in the bleeding ſeaſon." *Ibid. vol.* I. *p.* 180.

Theſe extracts, publiſhed in 1769 and 1770, will, I flatter myſelf, ſecure to me the priority of the diſcovery relative to the putrid and noxious particles of the air being conſumed by the vegetable creation. The whole of Dr. Prieſtley's experiments are ſo ingeniouſly conducted, and his concluſions ſo fairly drawn, that I cannot leave this ſubject without extracting from them ſo much as regards the preſent enquiry.

" When air has been freſhly and ſtrongly tainted with putrefaction, ſo as to ſmell

be much concerned with the increaſing heat of the ſeaſon, as ſuch as being crude, and unfermented, are newly ſown in the beginning of the ſpring, eſpecially in hot and looſe grounds; being already in ſo fair a progreſs by this artificial preparation, and which (if the proviſion to be made be very great) may be thus managed: Chooſe a fit piece of ground, and with boards (if it have not that poſition of itſelf) deſign it three feet high; lay

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" through the water, ſprigs of mint have preſently died, upon being put into it, their " leaves turning black; but if they do not die preſently, they thrive in a moſt ſurprizing " manner. In no other circumſtances have I ever ſeen vegetation ſo vigorous as in this " kind of air, which is immediately fatal to animal life. Though theſe plants have " been crouded in jars filled with this air, every leaf has been full of life; freſh ſhoots " have branched out in various directions, and have grown much faſter than other ſimi- " lar plants, growing in the ſame expoſure in common air.—This obſervation led me to " conclude, that plants, inſtead of affecting the air in the ſame manner with animal re- " ſpiration, reverſe the effects of breathing, and tend to keep the atmoſphere ſweet and " wholeſome, when it is become noxious, in conſequence of animals either living and " breathing, or dying and putrefying in it.—In order to aſcertain this, I took a quantity " of air, made thoroughly noxious, by mice breathing and dying in it, and divided it " into two parts; one of which I put into a phial immerſed in water; and to the other " (which was contained in a glaſs jar, ſtanding in water) I put a ſprig of mint. This " was about the beginning of Auguſt 1771, and after eight or nine days, I found that " a mouſe lived perfectly well in that part of the air, in which the ſprig of mint had " grown, but died the moment it was put into the other part of the ſame original quan- " tity of air; and which I had kept in the very ſame expoſure, but without any plant " growing in it.—This experiment I have ſeveral times repeated; ſometimes uſing air " in which animals had breathed and died; ſometimes uſing air tainted with vegetable " or animal putrefaction, and generally with the ſame ſucceſs.—Once I let a mouſe live " and die in a quantity of air which had been noxious, but which had been reſtored by " this proceſs, and it lived nearly as long as I conjectured it might have done in an equal " quantity of freſh air; but this is ſo exceedingly various, that it is not eaſy to form " any judgment from it; and in this caſe the ſymptom of *difficult reſpiration* ſeemed to " begin earlier than it would have done in common air.—Since the plants that I made " uſe of manifeſtly grow and thrive in putrid air; ſince putrid matter is well known to " afford proper nouriſhment for the roots of plants; and ſince it is likewiſe certain that " they receive nouriſhment by their leaves as well as by their roots, it ſeems to be ex- " ceedingly probable, that the putrid effluvium is in ſome meaſure extracted from the air, " by means of the leaves of plants; and therefore that they render the remainder more " fit for reſpiration.—Towards the end of the year ſome experiments of this kind did " not anſwer ſo well as they had done before, and I had inſtances of the relapſing of this " reſtored air to its former noxious ſtate: I therefore ſuſpended my judgment concerning

Book I. the firſt foot in fine earth, another of Seeds, Acorns, Maſt, Keys, Nuts, Haws, Holly-berries, &c. promiſcuouſly or ſeparate, with, now and then, a little mould ſprinkled amongſt them; the third foot wholly earth: Of theſe preparatory magazines make as many and as much larger ones as will ſerve your turn, continuing it from time to time as your ſtore is brought in. The ſame for ruder handlings may you alſo do by burying your

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" the efficacy of plants to reſtore this kind of noxious air, till I ſhould have an oppor-
" tunity of repeating my experiments, and giving more attention to them. Accordingly
" I reſumed the experiments in the ſummer of the year 1772, when I preſently had the
" moſt indiſputable proof of the reſtoration of putrid air by vegetation; and as the fact
" is of ſome importance, and the ſubſequent variation in the ſtate of this kind of air is a
" little remarkable, I think it neceſſary to relate ſome of the facts pretty circumſtantially.
" The air, on which I made the firſt experiments, was rendered exceedingly noxious by
" mice dying in it on the 20th of June. Into a jar nearly filled with one part of this
" air, I put a ſprig of mint, while I kept another part of it in a phial, in the ſame ex-
" poſure; and on the 27th of the ſame month, and not before, I made a trial of them,
" by introducing a mouſe into a glaſs veſſel, containing $2\frac{1}{2}$ ounce meaſures filled with
" each kind of air; and I noted the following facts. When the veſſel was filled with the
" air in which the mint had grown, a very large mouſe lived five minutes in it, before
" it began to ſhew any ſign of uneaſineſs. I then took it out, and found it to be as
" ſtrong and vigorous as when it was firſt put in; whereas in that air which had been
" kept in the phial only, without a plant growing in it, a younger mouſe continued not
" longer than two or three ſeconds, and was taken out quite dead. It never breathed
" after, and was immediately motionleſs. After half an hour, in which time the larger
" mouſe (which I had kept alive, that the experiment might be made on both the kinds
" of air with the very ſame animal) would have been ſufficiently recruited, ſuppoſing it
" to have received any injury by the former experiment, was put into the ſame veſſel of
" air; but though it was withdrawn again, after being in it hardly one ſecond, it was
" recovered with difficulty, not being able to ſtir from the place for near a minute. Af-
" ter two days, I put the ſame mouſe into an equal quantity of common air, and obſer-
" ved that it continued ſeven minutes without any ſign of uneaſineſs; and being very
" uneaſy after three minutes longer, I took it out. Upon the whole, I concluded that
" the reſtored air wanted about one fourth of being as wholeſome as common air. The
" ſame thing alſo appeared when I applied the teſt of nitrous air.—In the ſeven days, in
" which the mint was growing in this jar of noxious air, three old ſhoots had extended
" themſelves about three inches, and ſeveral new ones had made their appearance in
" the ſame time. Dr. Franklin and Sir John Pringle happened to be with me, when
" the plant had been three or four days in this ſtate, and took notice of its vigorous
" vegetation, and remarkably healthy appearance in that confinement.—On the 30th
" of the ſame month, a mouſe lived fourteen minutes, breathing naturally all the
" time, and without appearing to be much uneaſy, till the laſt two minutes, in the

ſeeds in dry ſand, or pulverized earth, barrelling them, as I ſaid, in tubs, or laid in heaps in ſome deep cellar, where the rigour of the winter may leaſt prejudice them; and I have filled old hampers, bee-hives and boxes with them, and found the like advantage, which is to have them ready for your Seminary, as before hath been ſhewed, and exceedingly prevent the Seaſon. There be alſo who affirm, that the careful cracking and opening

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" veſſel containing two ounce meaſures and a half of air which had been rendered " noxious by mice breathing in it almoſt a year before, and which I had found to be " moſt highly noxious on the 19th of this month, a plant having grown in it, but not " exceedingly well, theſe eleven days; on which account I had deferred making the " trial ſo long. The reſtored air was affected by a mixture of nitrous air, almoſt as " much as common air.—As this putrid air was thus eaſily reſtored to a conſiderable " degree of fitneſs for reſpiration, by plants growing in it, I was in hopes that by the " ſame means it might in time be ſo much more perfectly reſtored, that a candle " would burn in it; and for this purpoſe I kept plants growing in the jars which con- " tained this air till the middle of Auguſt following, but did not take ſufficient care " to pull out all the old and rotten leaves. The plants, however, had grown, and " looked ſo well upon the whole, that I had no doubt but that the air muſt conſtantly " have been in a mending ſtate; when I was exceedingly ſurprized to find, on the " 24th of that month, that though the air in one of the jars had not grown worſe, it " was no better, and that the air in the other jar was ſo much worſe than it had been, " that a mouſe would have died in it in a few ſeconds. It alſo made no effervеſcence " with nitrous air, as it had done before.——Suſpecting that the ſame plant might be " capable of reſtoring putrid air to a certain degree only, or that plants might have a " contrary tendency in ſome ſtages of their growth, I withdrew the old plant, and put " a freſh one in its place; and found that, after ſeven days, the air was reſtored to its " former wholeſome ſtate. This fact I conſider as a very remarkable one, and well de- " ſerving of a farther inveſtigation, as it may throw more light upon the principles of " vegetation. It is not, however, a ſingle fact; for I had ſeveral inſtances of the " ſame kind in the preceding year; but it ſeemed ſo very extraordinary, that air ſhould " grow worſe by the continuance of the ſame treatment by which it had grown better, " that, whenever I obſerved it, I concluded that I had not taken ſufficient care to " ſatisfy myſelf of its previous reſtoration.——That plants are capable of perfectly " reſtoring air injured by reſpiration, may, I think, be inferred with certainty from " the perfect reſtoration, by this means, of air which had paſſed through my lungs, " ſo that a candle would burn in it again, though it had extinguiſhed flame before, " and a part of the ſame original quantity of air ſtill continued to do ſo. Of this one " inſtance occurred in the year 1771; a ſprig of mint having grown in a jar of this " kind of air, from the 25th of July to the 17th of Auguſt following; and another " trial I made, with the ſame ſucceſs, the 7th of July 1772, the plant having grown " in it from the 29th of June preceding. In this caſe alſo I found that the effect

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of ſtones, which include the kernels, as ſoon as ripe, precipitate growth, and gain a year's advance; but this is erroneous. Now, if you gather them in moiſt weather, lay them a drying, and ſo keep them till you ſow, which may be as ſoon as you pleaſe after Chriſtmas. If they ſpire out before you ſow them, be ſure to commit them to the earth before the ſprout grows dry, or elſe expect little from them: And whenever you ſow, if you prevent not the little field-mouſe, he will be ſure to have the better ſhare *.

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"was not owing to any virtue in the leaves of mint; for I kept them conſtantly "changed in a quantity of this kind of air, for a conſiderable time, without making "any ſenſible alteration in it.——Theſe proofs of a partial reſtoration of air by plants "in a ſtate of vegetation, though in a confined and unnatural ſituation, cannot but "render it highly probable, that the injury which is continually done to the atmo- "ſphere by the reſpiration of ſuch a number of animals, and the putrefaction of ſuch "maſſes of both vegetable and animal matter, is, in part at leaſt, repaired by the "vegetable creation. And, notwithſtanding the prodigious maſs of air that is cor- "rupted daily by the above-mentioned cauſes; yet, if we conſider the immenſe "profuſion of vegetables upon the face of the earth, growing in places ſuited to their "nature, and conſequently at full liberty to exert all their powers, both inhaling and "exhaling, it can hardly be thought, but that it may be a ſufficient counterbalance to "it, and that the remedy is adequate to the evil.——Dr. Franklin, who, as I have "already obſerved, ſaw ſome of my plants in a very flouriſhing ſtate, in highly noxious "air, was pleaſed to expreſs very great ſatisfaction with the reſult of the experiments. "In his anſwer to the letter in which I informed him of it, he ſays, "*That the vege- table creation ſhould reſtore the air which is ſpoiled by the animal part of it, looks like a rational ſyſtem, and ſeems to be of a piece with the reſt. Thus fire purifies water all the world over. It purifies it by diſtillation, when it raiſes it in vapours, and lets it fall in rain; and farther ſtill by filtration, when, keeping fluid, it ſuffers that rain to percolate the earth. We knew before that putrid animal ſubſtances were converted into ſweet vege- tables, when mixed with the earth, and applied as manure; and now, it ſeems, that the ſame putrid ſubſtances, mixed with the air, have a ſimilar effect. The ſtrong thriving ſtate of your mint in putrid air ſeems to ſhew that the air is mended by taking ſomething from it, and not by adding to it.*"——Dr. Prieſtley's Experiments and Obſervations on different Kinds of Air, *p.* 86—94.

* It muſt be confeſſed that ſowing of Acorns, Beech-Maſt, Aſh-Keys, &c. in the Autumn, when thoſe ſeeds fall ſpontaneouſly from the trees, appears by much the moſt *natural* method; but the deſtruction made by the field-mouſe upon thoſe ſeeds, both at the time of ſowing and during the winter, has induced many Gentlemen to prefer Spring-ſowing to the Autumnal one. When this laſt is determined on, the acorns and other ſeeds muſt be carefully preſerved during the winter; and, in forming the maga- zines, care muſt be taken to keep the different ſorts apart from each other. It is not

4. But to purſue this to ſome farther advantage, as to what concerns the election of your ſeed, it is to be conſidered, that there is a vaſt difference in trees even of the ſame growth and bed, which I judge to proceed from the variety and quality of the ſeed: This, for inſtance, is evidently ſeen in the heart, procerity, and ſtature of timber; and therefore chooſe not your ſeeds always from the moſt fruitful trees, which are commonly the moſt aged and decayed, but from ſuch as are found moſt ſolid and fair. Nor, for this reaſon, covet the largeſt acorn, &c. but (as huſbandmen do their wheat) the moſt weighty, clean, and bright. This obſervation we deduce from fruit-trees, which we ſeldom find to bear ſo kindly and plentifully from a ſound ſtock, ſmooth rind, and firm wood, as from a rough, lax, and untoward tree; which is rather prone to ſpend itſelf in fruit (the ultimate effort, and final endeavour of its moſt delicate ſap) than in ſolid and cloſe ſubſtance to encreaſe the timber. And this ſhall ſuffice, tho' ſome haply might here recommend to us a more accurate microſcopical examen, to interpret their moſt ſecret ſchematiſms, which were an over nicety for theſe great plantations.

5. As concerning the medicating and inſuccation of ſeeds, or enforcing the earth by rich and generous compoſts, &c. for trees of theſe kinds, I am no great favourer of it; not only becauſe the charge would much diſcourage the work, but for that we find it unneceſſary, and, for moſt of our foreſt-trees, noxious; ſince even where the ground is too fertile, they thrive not ſo well; and if a mould be not proper for one ſort, it may be fit for another. Yet I would not, by this, hinder any from the trial, what advance ſuch experiments will produce: In the mean time, for the ſimple imbibition of ſome ſeeds and kernels, when they prove extraordinary dry, as the ſeaſon may fall out, it might not be amiſs to macerate them in milk or water only, a little impregnated with cow-dung, &c. during the ſpace

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cuſtomary to preſerve the acorns, &c. in the manner recommended by Mr. Evelyn; but, as he always ſpeaks from experience, his method ſhould not be raſhly condemned. Our Seedſmen, when they find it neceſſary to preſerve their acorns for Spring-ſowing, lay them thin upon a boarded floor; in which ſituation, if full ripe, they will retain their vegetative power during the winter. Aſh-Keys being ſubject to grow mouldy, ſhould be ſown as ſoon as gathered. The cones of Fir, Beech-Maſt, &c. as they are not ſubject to heat, may be kept in bags, or may be ſpread upon a dry floor in the manner of acorns, till the Seminary calls for them in the Spring.——The manner of ſowing the various ſeeds of foreſt-trees will be explained in the next Chapter, which treats of the SEMINARY and NURSERY.

Book I. of twenty-four hours, to give them a ſpirit to ſprout and chet the ſooner; eſpecially if you have been retarded in your ſowing without the former preparation: But concerning the mould, ſoiling, and preparations of the ground, I refer you to my Treatiſe of Earth, if what you meet with in this do not abundantly encounter all thoſe difficulties.

6. Being thus provided with ſeeds of all kinds, I would adviſe to raiſe woods by ſowing them apart in ſeveral places deſtined for their growth, where the mould being prepared, as I ſhall ſhew hereafter, and ſo qualified, if election be made, as beſt to ſuit with the nature of the ſpecies, they may be ſown promiſcuouſly, which is the moſt natural and rural; or in ſtraight and even lines, for hedge-rows, avenues, and walks, which is the more ornamental: But becauſe ſome may chooſe rather to draw them out of Nurſeries; that the culture is not much different, nor the hinderance conſiderable, provided they be early and carefully removed, I will finiſh what I have to ſay concerning theſe trees in the Seminary, and ſhew how they are there to be raiſed, tranſplanted, and governed till they can ſhift for themſelves.

Air. As to the Air and Water, they are certainly of almoſt as great importance to the life and proſperity of trees and vegetables; and therefore it is to be wiſhed for and ſought (where they are defective, and they commonly follow, or indicate the nature of the ſoil, or the ſoil of them, taking ſoil here promiſcuouſly for the mould) that they be neither too keen or ſharp, too cold or hot, not infected with fogs and poiſonous vapours, or expoſed to ſulphurous exhalations, or frigiverous winds, reverberating from hills and other ill-ſituate eminences, preſſing down the incumbent particles ſo tainted or conveyed through the incloſed vallies; but ſuch as may gently enter and pervade the cenabs and veſſels, deſtined and appointed for their reception, intromiſſion, reſpiration, and paſſage, in almoſt continual motion: In a word, ſuch as is moſt agreeable to the life of man (the inverted head compared to the root, both vegetables and animals alike affected with thoſe neceſſary principles, Air and Water, ſoon ſuffocated and periſhable for the want of either) duly qualified with their proper mixts, be it nitre, or any other vegetable matter, though we neither ſee, nor diſtinctly taſte it; nay, ſo univerſally pervading and neceſſary, that all aquatics, how deeply ſoever ſubmerged, could not ſubſiſt without this active element the air.

The ſame qualification is, as we ſaid, required in water, to which it is of ſo near alliance, and whoſe office it is not only to humectate, mollify, and prepare both the ſeeds and roots of vegetables, to receive the nutrition, pabulum, and food, of which this of water as well as air are the proper vehicles, inſinuating what they carry into the numerous pores, and through the tubes, canales, and other emulgent paſſages and percolations to the ſeveral veſſels, where (as in a ſtomach) it is elaborated, concocted, and digeſted, for diſtribution through every part of the plant; and therefore had need be ſuch as ſhould feed, not ſtarve, infect, or corrupt; which depends upon the nature and quality of the mixed, with what other virtue, ſpirit, mineral, or other particles, accompanying the pureſt ſprings (to appearance) paſſing through the cloſeſt ſtrainers. This therefore requires due examination, and ſometimes expoſure to the air and ſun, and accordingly the crudity and other defects taken off and qualified: All which rain-water, that has had its natural circulation, is greatly free from, ſo it meets with no noxious vapours in the deſcent, as it muſt do paſſing through fuliginous clouds of ſmoak and ſoot, over and about great cities, and other volcanos, continually vomiting out their acrimonious, and ſometimes peſtiferous fervor, infecting the ambient air, as it perpetually does about London and for many miles adjacent, as I have ſhewn in my treatiſe entitled *Fumifugium*.

In the mean time, whether water alone is the cauſe of the ſolid and bulky part, and conſequently of the augmentation of trees and plants, or without any thing more to do with that element than as it ſerves to tranſport ſome other matter, is very ingenuouſly diſcuſſed, and curiouſly enquired into by Dr. Woodward, in his *Hiſtory of the Earth*, fortified with divers nice experiments, too large to be here inſerted *. The ſum is,

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* It is of the utmoſt conſequence to determine what is the food of plants. Upon that queſtion Philoſophers have widely differed. From a number of experiments, accurately conducted, I am led to believe that all vegetables, from the hyſſop upon the wall to the cedar of Lebanon, receive their principal nouriſhment from oily particles incorporated with water, by means of an alkaline ſalt or abſorbent earth. Till oil is made miſcible, it is unable to enter the radical veſſels of vegetables; and, on that account, providence has bountifully ſupplied all natural ſoils with chalky or other abſorbent particles. I ſay natural ſoils, for thoſe which have been aſſiſted by art are full of materials for that purpoſe; ſuch as lime, marl, ſoap-aſhes, and the volatile alkaline ſalt of putrid dunghills. It may be aſked, whence do natural ſoils receive their oily

Book I. that water, be it of rain or the river, (ſuperior or inferior) carries with it a certain ſuperfine terreſtrial matter, not deſtitute of vegetative particles, which gives body, ſubſtance, and all other requiſites to the growth and perfection of the plant, with the aid of that due heat which gives life

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particles? I anſwer, the air ſupplies them. During the ſummer months, the atmoſphere is full of putrid exhalations ariſing from the ſteam of dunghills, the perſpiration of animals and ſmoak. Every ſhower brings down theſe oleaginous particles for the nouriſhment of plants.

The *ingenious Mr. Tull*, and others, have contended for earth's being the food of plants. If ſo, all ſoils equally tilled would prove equally prolific. The increaſed fertility of a well-pulveriſed ſoil, induced him to imagine that the plow could ſo minutely divide the particles of earth, as to fit them for entering into the roots of plants. An open ſoil, if not too light in its own nature, will always produce plentiful crops. It readily receives the air, rains, and dews into its boſom, and at the ſame time gives the roots of plants a free paſſage in queſt of food. This is the true reaſon why land well tilled is ſo remarkably fruitful.—Water is thought, by ſome, to be the food of vegetables, when in reality it is only the vehicle of nouriſhment. Water is an heterogeneous fluid, and is no where to be found pure. It always contains a ſolution of animal or vegetable ſubſtances. Theſe conſtitute the nouriſhment of plants, and the element in which they are minutely ſuſpended, acts only as a vehicle, in guiding them through the fine veſſels of the vegetable body. The hyacinth, and other bulbous roots, are known to perfect their flowers in pure water. Hence ſuperficial obſervers have drawn an argument in favour of water being the food of vegetables. But the truth is, the roots, ſtem, and flowers of ſuch plants are nouriſhed by the mucilaginous juices of the bulb, diluted by the ſurrounding water. This mucilage is juſt ſufficient to perfect the flower—and no more. Such a bulb neither forms ſeeds, nor ſends forth offſets. At the end of the ſeaſon, it appears weak, ſhrivelled, and exhauſted, and is rendered unfit to produce flowers the ſucceeding year. A root of the ſame kind, that has been fed by the oily and mucilaginous juices of the earth, eſſentially differs in every particular. It has a plump appearance, is full of mucilage—with off-ſets upon its ſides. All rich ſoils, in a ſtate of nature, contain oil; and in thoſe lands which have been under the plow for ſome years, it is found in proportion to the quantity of putrid dung that has been laid upon them, making an allowance for the crops they have ſuſtained.——To ſet this matter in a clearer light, let us attend to the effects of manures of an oily nature, and we ſhall ſoon be ſatisfied that oil, however modified, is one of the chief things concerned in vegetation. Rape-duſt, when laid upon land, is a ſpeedy and certain manure, though an expenſive one, and will generally anſwer beſt on a limeſtone land, or where the ſoil has been moderately limed. This ſpecies of manure is much eſteemed by the farmer. It contains the food of plants ready prepared; but as it is not capable of looſening the ſoil by any fermentation, the lands upon which it is laid ought to be in excellent tilth. At preſent, that uſeful article of

and motion to the vehicles paſſage through all the parts of the vegetable, continually aſcending, till (having ſufficiently ſaturated them) it tranſpires the reſt of the liquid at the ſummity and tops of the branches into the atmoſphere, and leaving ſome of the leſs-refined matter in a viſcid

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huſbandry is much diminiſhed in goodneſs, owing to the improved methods of extracting the oil from the rape. Heat and preſſure are employed in a double degree.—— Farmers that live in the neighbourhood of large towns uſe abundance of ſoot. It is an oily manure, but different from the former, containing alkaline ſalt in its own nature, calculated as well for opening the ſoil, as for rendering the oily parts miſcible with water. It is obſerved that pigeons dung is a rich and haſty manure. Theſe animals feed chiefly upon grains and oily ſeeds; it muſt therefore be expected that their dung ſhould contain a large proportion of oil. The dung of ſtable-kept horſes is alſo a ſtrong manure, and ſhould not be uſed until it has undergone the *putrid ferment*, in order to mix and aſſimilate its oily, watery, and ſaline parts. Beans, oats, and hay, contain much oil. The dung of horſes that are kept upon green herbage, is of a weaker kind, containing much leſs oil. Swines dung is of a ſaponaceous and oily nature, and perhaps is the richeſt of the animal manures. When made into a compoſt and applied with judgment, it is excellent for arable lands. The dung of ruminant animals, as cows and ſheep, is preferable to that of horſes at graſs, owing to the quantity of animal juices mixed with their food in chewing. And here I beg leave to remark in general, that the fatter the animal, *cæteris paribus*, the richer the dung. Human ordure is full of oil and a volatile alkaline ſalt. By itſelf, it is too ſtrong a manure for any land; it ſhould therefore be made into a compoſt before it is uſed. The dung of carnivorous animals is plentifully ſtored with oil. Animals that feed upon ſeeds and grains come next, and after them follow thoſe which ſubſiſt upon graſs only. To ſuit theſe different manures to their proper ſoils, requires the greateſt judgment of the farmer, as what may be proper for one ſoil, may be highly detrimental to another.

In order to ſtrengthen my argument in favour of oil being the principal food of plants, I muſt beg leave to obſerve, that all vegetables, whoſe ſeeds are of an oily nature, are found to be remarkable impoveriſhers of the ſoil, as hemp, rape, and flax; for which reaſon, the beſt manures for lands worn out by theſe crops, are ſuch as have a good deal of oil in their compoſition; but then they muſt be laid on with lime, chalk, marl, or ſoap-aſhes, ſo as to render the oily particles miſcible with water.—— The book of nature may be diſplayed, to ſhew that oily particles conſtitute the nouriſhment of plants in their embryo ſtate; and, by a fair inference, we may ſuppoſe that ſomething of the ſame nature is continued to them as they advance in growth. The oily ſeeds, as rape, hemp, line, and turnip, conſiſt of two lobes, which, when ſpread upon the ſurface, form the ſeminal leaves. In them the whole oil of the ſeed is contained. The moiſture of the atmoſphere penetrates the cuticle of the leaves, and, mixing with the oil, conſtitutes an emulſion for the nouriſhment of the plant. The

BOOK I. honey-dew, or other exſudations (often perceived on the leaves and bloſſoms) anon deſcending and joining again with what they meet, repeat this courſe in perpetual circulation. Add to this, that from hence thoſe regions and places, crowded with numerous and thick-ſtanding

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ſweetneſs of this balmy fluid invites the fly, againſt which no ſufficient remedy has, as yet, been diſcovered. The oleaginous liquor being conſumed, the ſeminal leaves decay, having performed the office of a mother to her tender infant. To perſons unacquainted with the analogy between plants and animals, this reflection will appear ſtrange. Nothing, however, is more demonſtrable.—The leguminous and farinaceous plants keep their placenta, or ſeminal leaves, within the earth; in which ſituation they ſupply the tender germ with oily nutriment, until its roots are grown ſufficiently ſtrong to penetrate the ſoil.

It is uſual to talk of the ſalts of the earth; but chymiſtry has not been able to diſcover any ſalts in land which has not been manured, though oil may be readily obtained from every ſoil, the very ſandy ones excepted. Marl, though a rich manure, has no ſalts. It is thought to contain a ſmall portion of oleaginous matter, and an abſorbent earth, of a nature ſimilar to limeſtone, with a large quantity of clay intermixed. Lime mixed with clay comes neareſt to the nature of marl of any factitious body that we know of, and may be uſed as ſuch, where it can be had without much expence. By increaſing the quantity of clay, it will make an excellent compoſt for a light ſandy ſoil; but to make the ground fertile, woollen rags, rotten dung, or any oily manure, ſhould be incorporated with it ſome time before it is laid on.——It is a received opinion, that lime enriches the land it is laid upon, by means of ſupplying a ſalt fit for the nouriſhment of plants; but by all the experiments that have been made upon lime, it is found to contain no kind of ſalt. Its operation therefore ſhould be conſidered in a different light; by the fermentation that it induces, the earth is opened and divided, and, by its abſorbent and alkaline quality, it unites the oily and watery parts of the ſoil. It alſo ſeems to have the property of collecting the acid of the air, which it readily forms into a neutral ſalt, of great uſe in vegetation. From viewing lime in this light, it is probable that it tends to rob the ſoil of its oily particles, and in time will render it barren, unleſs we take care to ſupport it with rotten dung, or other manures of an oily nature. As light ſandy ſoils contain but a ſmall portion of oleaginous particles, we ſhould be extremely cautious not to overdo them with lime; unleſs we can at the ſame time aſſiſt them liberally with rotten dung, woollen rags, ſhavings of horn, and other manures of an animal kind. Its great excellence, however, upon a ſandy ſoil, is by mechanically binding the looſe particles, and thereby preventing the liquid parts of the manure from eſcaping out of the reach of the radical fibres of the plants. Upon clay the effect of lime is different; for by means of the gentle fermentation that it produces, the unſubdued ſoil is opened and divided; the manures laid on readily come into contact with every part of it; and the fibres of the plants have full liberty to ſpread themſelves. It is generally ſaid that lime anſwers

foreſt-trees and woods (which hinder the neceſſary evolition of this ſuperfluous moiſture and intercourſe of the air) render thoſe countries and places more ſubject to rain and miſts, and conſequently unwholeſome, as is found in our American plantations, as formerly nearer us in Ireland; CHAP. I.

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better upon ſand than clay. This obſervation will undoubtedly hold good as long as the farmer continues to lime his clay lands in a ſcanty manner. Let him treble the quantity, and he will then be convinced that lime is better for clay than ſand. It may be juſtly anſwered, that the profits will not admit of the expence. I agree. But then it muſt be underſtood that it is the application, and not the nature of the lime, that ſhould be called in queſtion. Clay, well limed, will fall in water, and ferment with acids. Its very nature is changed. Under ſuch agreeable circumſtances, the air, rains, and dews are freely admitted, and the ſoil is enabled to retain the nouriſhment that each of them brings. In conſequence of a fermentation raiſed in the ſoil, the fixed air is ſet at liberty, which, in a wondertul manner, promotes vegetation. It is the nature of lime to attract oils and diſſolve vegetable bodies. Upon theſe principles we may account for the wonderful effects of lime in the improvement of black moorland. Moor-earth conſiſts of diſſolved, and half-diſſolved, vegetable ſubſtances. It is full of oil. Lime aſſimilates the one and diſſolves the other. Such lands, not originally worth fourpence per acre, may be made, by paring, burning, and liming, to produce plentiful crops of turnips, which may be followed with oats, barley, or graſs-ſeeds, according to the inclination of the owner. Theſe obſervations, however, are rather foreign to the preſent argument, to which I ſhall now return.

To the univerſal principle, oil, we muſt add another of great efficacy, though very little underſtood; I mean the nitrous acid of the air. That the air does contain the rudiments of nitre, is demonſtrable from the manner of making ſalt-petre in the different parts of the world. The air contains no ſuch ſalt as perfect nitre; it is a factitious ſalt, and is made by the nitrous acid falling upon a proper matrix. The makers of nitre form that matrix of the rubbiſh of old houſes, fat earth, and any fixed alkaline ſalt. The univerſal acid, as it is called, is attracted by theſe materials, and forms true nitre, which is rendered pure by means of cryſtallization, and in that form it is brought to us. In very hot countries the natural earth forms a matrix for nitre, which makes the operation very ſhort. It is obſerved that nitre is moſt plentifully formed in winter, when the wind is northerly: hence we may underſtand the true reaſon why farmers and nurſerymen lay up their lands in high ridges during the winter months. The good effects of that operation are wholly attributed to the mechanical action of the froſt upon the ground. Light ſoils, as well as the tough ones, may be expoſed in high ridges, but with ſome limitation, in order to imitate the mud walls in Germany, which are found, by experience, to collect conſiderable quantities of nitre during the winter. After ſaying ſo much in praiſe of nitre, it will be expected that I ſhould produce ſome proofs of its efficacy, when uſed as manure. I muſt confeſs that experiments do not give us any ſuch proofs. Perhaps too large a quantity has been uſed; or

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both ſince ſo much improved by felling and clearing theſe ſpacious ſhades, and letting in the air and ſun, and making the earth fit for tillage and paſture, that thoſe gloomy tracts are now become healthy and habitable. It is not to be imagined how many noble ſeats and dwellings in this nation of ours

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rather, it could not be reſtored to the earth with its particles ſo minutely divided, as when it remained united with the ſoil, by means of the chymiſtry of nature. I ſhall therefore conſider this nitrous acid, or, as philoſophers call it, the *acidum vagum*, in the light of a vivifying principle, with whoſe operation we are not yet fully acquainted.—A curious obſerver will remark, that there ſubſiſts a ſtrong analogy between plants and animals. Oil and water ſeem to make up the nouriſhment of both. Earth enters very little into the compoſition of either. It is known that animals take in a great many earthly particles at the mouth, but they are ſoon diſcharged by urine and ſtool. Vegetables take in the ſmalleſt portion imaginable of earth; and the reaſon is, they have no way to diſcharge it. It is highly probable, that the radical fibres of plants take up their nouriſhment from the earth in the ſame manner that the lacteal veſſels abſorb the nutriment from the inteſtines; and as the oily and watery parts of our food are perfectly united into a milky liquor, by means of the ſpittle, pancreatic juice, and bile, before they enter the lacteals, we have all the reaſon imaginable to keep up the analogy, and ſuppoſe that the oleaginous and watery parts of the ſoil are alſo incorporated, previous to their being taken up by the abſorbing veſſels of the plant. To form a perfect judgment of this, we muſt reflect that every ſoil, in a ſtate of nature, has in itſelf a quantity of abſorbent earth, ſufficient to incorporate its inherent oil and water; but when we load it with fat manures, it becomes eſſentially neceſſary to beſtow upon it, at the ſame time, ſomething to aſſimilate the parts. Lime, ſoap-aſhes, kelp, marl, and all the alkaline ſubſtances, perform that office. In order to render this operation viſible to the ſenſes: Diſſolve one drachm of Ruſſia pot-aſh in four ounces of water; then add one ſpoonful of oil. Shake the mixture, and it will inſtantly become an uniform maſs of a whitiſh colour, adapted to all the purpoſes of vegetation. This eaſy and familiar experiment is a juſt repreſentation of what happens after the operation of Burn-baking, and conſequently may be conſidered as a confirmation of the hypotheſis advanced.—Let us attend to the proceſs. The ſward being reduced to aſhes, a fixed alkaline ſalt is produced. The moiſture of the atmoſphere ſoon reduces that ſalt into a fluid ſtate, which, mixing with the ſoil, brings about an union of the oily and watery parts, in the manner demonſtrated by the experiment. When the under ſtratum conſiſts of a rich vegetable mould, the effects of Burn-baking will be laſting. But when the ſoil happens to be thin and poor, the firſt crop frequently ſuffers before it arrives at maturity. The farmer, therefore, who is at the expence of paring and burning a thin ſoil, ſhould beſtow upon it a portion of rotten dung, or ſhambles manure, before the aſhes are ſpread, in order to ſupply the deficiency of oily particles. In conſequence of this prudent management, the crop will be ſupported during its growth, and the land will be preſerved in health and vigour.——Hitherto I have conſidered

(to all appearance well ſituated) are for all that unhealthful, by reaſon of ſome grove or hedge-rows of antiquated dotard trees (nay, ſometimes a ſingle tuft only, eſpecially the falling autumnal leaves neglected to be taken away) filling the air with muſty and noxious exhalations, which being

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plants as nouriſhed by their roots. I ſhall now take a view of them as nouriſhed by their leaves. An attention to this part of the vegetable ſyſtem is eſſentially neceſſary. Vegetables that have a ſucculent leaf, ſuch as vetches, peaſe, beans, and buck-wheat, draw a great part of their nouriſhment from the air, and on that account impoveriſh the ſoil leſs than wheat, oats, barley, or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing plants, and, conſequently, impoveriſhers of the ſoil; but the former leſs ſo than the latter, owing to the greater ſucculency of its leaf. The leaves of all kinds of grain are ſucculent for a time, during which period the plants take little from the earth; but as ſoon as the ear begins to be formed, they loſe their ſoftneſs, and diminiſh in their attractive power. The radical fibres are then more vigorouſly employed in extracting the oily particles of the earth, for the nouriſhment of the ſeed.

Vegetables being fixed to a place, have few offices to perform. An increaſe of body and maturation of their ſeed, ſeems all that is required of them. For theſe purpoſes, providence has wiſely beſtowed upon them organs of a wonderful mechaniſm. The anatomical inveſtigation of theſe organs, is the only rational method of arriving at any certainty concerning the laws of the vegetable œconomy. Upon this ſubject Dr. Hales judiciouſly obſerves, "That as the growth and preſervation of vegetable "life is promoted and maintained, as in animals, by the very plentiful and regular "motion of their fluids, which are the vehicles ordained by nature to carry nutriment "to every part, it is therefore reaſonable to hope that in them alſo, by the ſame me-"thod of enquiry, conſiderable diſcoveries may in time be made, there being, in "many reſpects, a great analogy between plants and animals."

The ſeed of a plant, after it has dropt from the ovarium, may be conſidered as an impregnated ovum, within which the embryo plant is ſecurely lodged. In a few days after it has been committed to the earth, we may diſcern the rudiments of the future plant. Every part appears to exiſt in miniature. The nutritive juices of the ſoil inſinuate themſelves between the original particles of the plant, and bring about an extenſion of its parts. This is what is called the growth of the vegetable body. With regard to this increaſe by addition and extenſion, there ſeems to be a great analogy between the animal and vegetable kingdoms. I have already endeavoured to prove that oily particles conſtitute the chief nouriſhment of plants and animals; and as I apprehend that much depends upon a proper inveſtigation of the ſubject, I ſhall occaſionally introduce ſome other proofs in ſupport of my opinion. Every one knows that animals, inſtead of being ſtrengthened, are enfeebled by a ſupply of improper nouriſhment. It is the ſame thing with regard to vegetables; but with this difference, that animals refuſe whatever is improper, while vegetables, from their paſſive nature,

Book I. ventilated by glades cut through them, for paſſage of the ſtagnant vapours, have been cured of this evil, and recovered their reputation.

But to return to where we left: Water in this action, imbibed with ſuch matter, applicable to every ſpecies of plants and vegetables, does not,

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muſt be content with what we give them.——The impregnated ovum of every animal, after it has paſſed down the Fallopian tube, and fixed itſelf to the bottom of the uterus, is found to contain the tender embryo within two membranes called Chorion and Amnion. In this ſituation the embryo could not long ſubſiſt without a ſupply of nouriſhment. Nature has therefore beſtowed upon it a placenta and umbilical chord, through which the blood and juices of the mother are tranſmitted, for its preſervation and increaſe. Seeds are diſpoſed by providence nearly in the ſame manner. They have two coverings, anſwering to the Chorion and Amnion, and two lobes which perform the office of the placenta. Theſe lobes conſtitute the body of the ſeed, and, in the farinaceous kinds, they are the flour of the grain. Innumerable ſmall veſſels run through the ſubſtance of the lobes, which, uniting as they approach the ſeminal plant, form a ſmall chord to be inſerted into the body of the germ. Thro' it the nutriment ſupplied by the placenta, or lobes, is conveyed for the preſervation and increaſe of the embryo plant. In order that I may be clearly underſtood, it will be neceſſary to obſerve, that the lobes of farinaceous grains are fixed in the earth. They are therefore improperly termed ſeminal leaves, being rather the placenta, or cotyledons of the plant. On the contrary, vegetables that have an oily ſeed, as rape, hemp, line, and turnip, carry their lobes upward, and ſpread them upon the ſurface, in the form of broad leaves. Theſe, though they perform the office of a placenta, are properly ſeminal leaves; and to this diſtinction I ſhall adhere. Plate 1. Fig. 1. repreſents the body, or placenta, of a bean, with its germ, radicle, umbilical chord, and ramifications.——*a*. The germ. *b*. The body, or placenta, with the umbilical chord and ramifications. *c*. The radicle. Fig. 3. repreſents the placenta, or ſeed-leaves, of a turnip, with its radicle and germ.——*a*. The germ. *b*. The placenta, or ſeed-leaves. *c*. The radicle. Fig. 2. repreſents the germ of a grain of wheat, with its root and capſule, containing the milky juice for the nouriſhment of the tender plant.—*a*. The origin of the crown. *b*. The pipe of communication between the firſt roots and the crown. *c*. The grain with its firſt roots. To illuſtrate the ſubject of vegetation, let us take a view of what happens to a bean, after it has been committed to the earth. In a few days, ſooner or later, according to the temperature of the weather and diſpoſition of the ſoil, the external coverings open at one end, and diſcloſe to the naked eye part of the placenta, or body of the grain. This ſubſtance conſiſts of two lobes, between which the ſeminal plant is ſecurely lodged. Soon after the opening of the membranes, a ſharp-pointed body appears. This is the root. By a kind of principle, which ſeems to carry with it ſome appearance of inſtinct, it ſeeks a paſſage downwards, and fixes itſelf into the



Fig. 2.

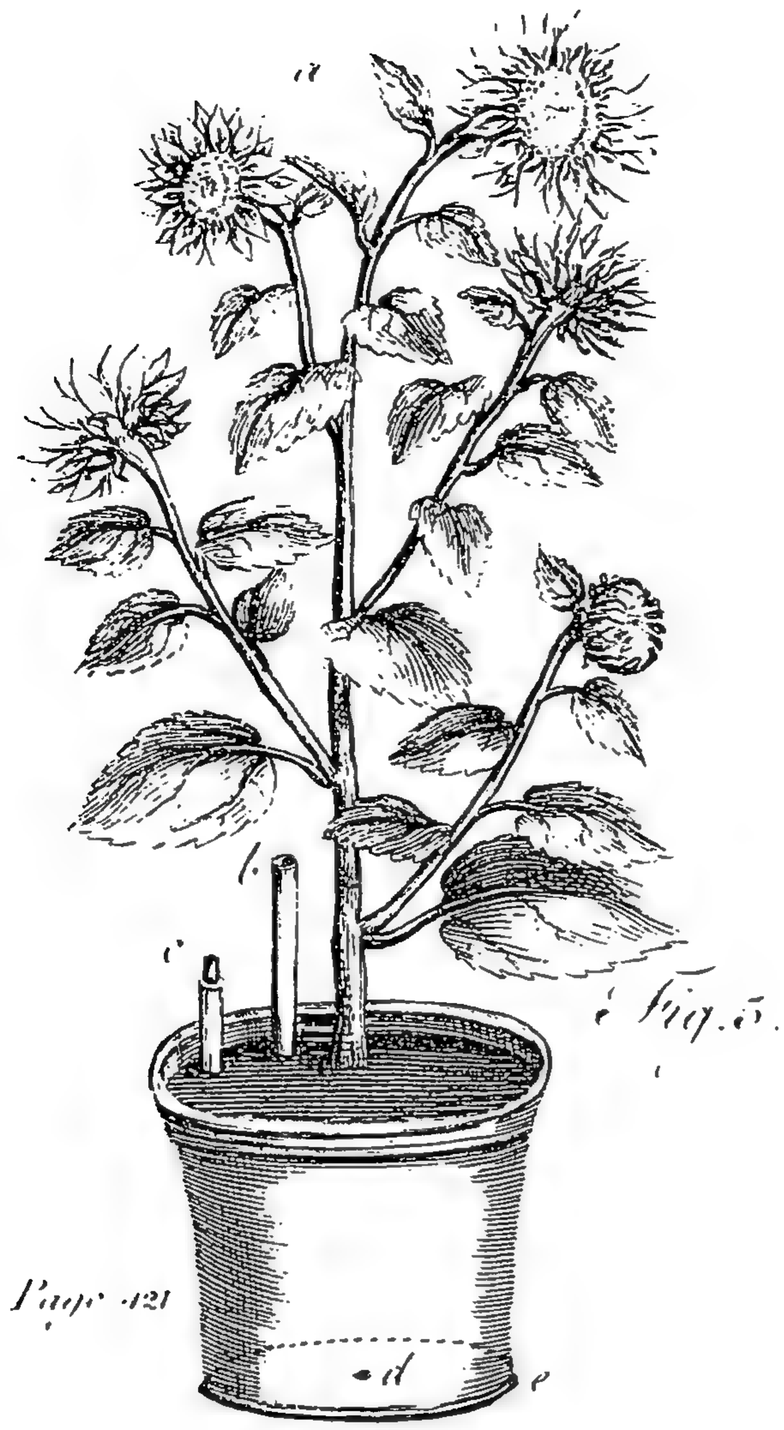


Fig. 5.

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Fig. 4.

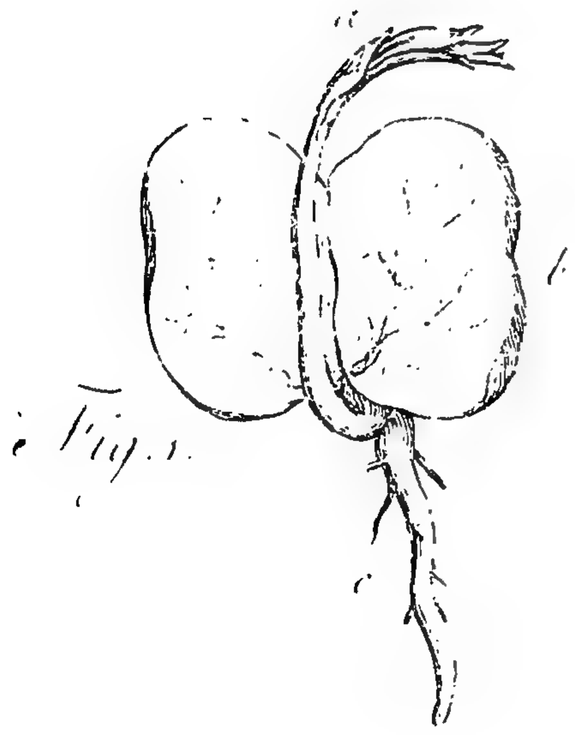


Fig. 1.

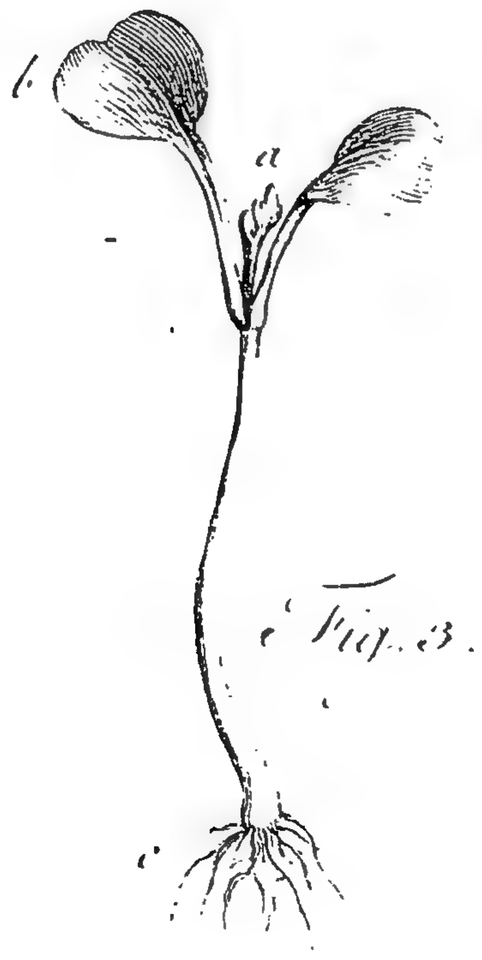


Fig. 3.

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as we affirmed, operate to the full extent and perfection of what it gives and contributes of neceſſary and conſtituent matter, without the ſoil and temper of the climate co-operate, which otherwiſe retards both the growth and ſubſtance of what the earth produces, ſenſibly altering their qualities, CHAP. I.

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ſoil. At this period the root is a ſmooth and poliſhed body, and perhaps has but little power to abſorb any thing from the earth, for the nutriment of the germ. The two lobes now begin to ſeparate, and the germ, with its leaves, may plainly be diſcovered. As the germ increaſes in ſize, the lobes are further ſeparated, and the tender leaves being cloſely joined, puſh themſelves forward in the form of a wedge. Theſe leaves take a contrary direction to the root. Influenced by the ſame miraculous inſtinct, if I may be allowed the expreſſion, they ſeek a paſſage upward, which having obtained, they lay aſide their wedge-like form, and ſpread themſelves in a horizontal direction, as being the beſt adapted for receiving the rains and dews. The radicle, every hour encreaſing in ſize and vigour, puſhes itſelf deeper into the earth, from which it now draws ſome nutritive particles. At the ſame time the leaves of the germ, being of a ſucculent nature, aſſiſt the plant, by attracting from the atmoſphere ſuch particles as their tender veſſels are fit to convey. Theſe particles, however, are of a watery kind, and have not in their own nature a ſufficiency of nutriment for the increaſing plant.——Vegetables and animals, during their tender ſtates, require a large ſhare of balmy nouriſhment. As ſoon as an animal is brought into life, the milk of its mother is ſupplied in a liberal ſtream, while the tender germ ſeems only to have the crude and watery juices of the earth for its ſupport. In that, however, we are deceived. The author of nature, with equal eye, watches over the infancy of all his works. The animal enjoys the milky humour of its parent. The vegetable lives upon a ſimilar fluid, though differently ſupplied. For its uſe the farinaceous lobes are melted down into a milky juice, which, as long as it laſts, is conveyed to the tender plant by means of innumerable ſmall veſſels, which are ſpread through the ſubſtance of the lobes. Theſe veſſels uniting into one common trunk enter the body of the germ, and perform the office of an umbilical chord. Without this ſupply of balmy liquor, the plant muſt inevitably have periſhed, its root being then too ſmall to abſorb a ſufficiency of food, and its body too weak to aſſimilate it into nouriſhment.—How beautiful is the ſemblance between this and the imagery of Lucretius!

Hinc ubi quæque loci regio opportuna dabatur,
Creſcebant uteri terræ, radicibus apti;
Quos ubi tempore maturo patefecerat aetas
Infantum fugiens humorem, auraſque petiſſens,
Convertebat ibi natura foramina terræ,
Et ſuccum venis cogebat fundere apertis
Conſimilem lactis; ſicut nunc fœmina quæque
Cum peperit, dulci repletur lacte, quod omnis
Impetus in mammas convertitur ille alimenti. Lib. v. l. 807.

BOOK I. if ſome friendly and genial heat be wanting to exert the prolific virtue: This we find, that the hot and warmer regions produce the talleſt and goodlieſt trees and plants, in ſtature and other properties far exceeding thoſe of the ſame ſpecies, born in the cold North; ſo as what is a giant in the one, becomes a pumilo, and, in compariſon, but a ſhrubby dwarf in the other; deficient of that active ſpirit, which elevates and ſpreads its prolific matter and continual ſupplies without check, and is the cauſe of the leaves deferting the branches, whilſt thoſe trees and plants of the more benign climate are clad in perennial verdure;——and thoſe herbaceous plants, which with us in the hotteſt ſeaſons hardly perfect their ſeeds before win-

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Turnips, and all the tribe of Braſſicas, in oppoſition to the leguminous and farinaceous plants, ſpread their ſeminal leaves upon the ſurface. Theſe leaves contain all the oil of the ſeed, which, when diluted by the moiſture of the atmoſphere, forms an emulſion of the moſt nouriſhing quality. How ſimilar is this juice to the milk of animals! On account of its ſweetneſs, the ſeminal leaves are greedily devoured by the fly. This demonſtrably proves that oil conſtitutes the nouriſhment of plants in their tender ſtate; and, by a fair inference, we may ſuppoſe that it alſo nouriſhes them as they advance in growth. A grain of wheat, as ſoon as the germ has made its appearance, ſhews the milky liquor to the naked eye; but the umbilical chord, with its ramifications, can only be diſcovered by the aſſiſtance of the niceſt glaſſes. As the plant increaſes in ſize, the balmy juice diminiſhes, till at laſt it is quite exhauſted. The umbilical chord then dries up, and the external covering of the grain appears connected to the root in the form of a ſhrivelled bag. See plate 1. Fig. 4. *c*.——Here is no mortality: From the moment that the ſeed is lodged in its parent earth, the vegetative ſoul begins its operations, and, in one continued miracle, proves the wiſdom and bounty of an almighty providence.——It is worthy of obſervation, that farinaceous vegetables and oviparous animals are nouriſhed, in their tender ſtates, nearly in the ſame manner. We have already ſeen that the embryo plant is ſupported by the farina melted down into a milky liquor, and conveyed into its body by means of an umbilical chord, at a time when the radicle was unable to ſupply a ſufficiency of nutriment. An oviparous animal, from the time that it is brought into light, ſeems to receive all its nouriſhment from without. This, however, is only an appearance. The yolk of the egg, remaining intire during incubation, is received into the body of the animal, and, in a manner ſimilar to the paſſage of the milky juice of the vegetable, is ſlowly conveyed into the veſſels of the tender chick. Thus a ſweet nouriſhment is prepared at a time when neither the induſtry of the animal, nor the attention of its mother, could have procured a ſufficient ſupply.——How beautiful are the general laws of providence! The more we explore them, the more we have cauſe for wonder and aſtoniſhment. Every thing is wiſely diſpoſed; nothing is fortuitous: all is order, regularity, and wiſdom.

ter, require to be near their genial beds and nurſe, and ſometimes the artificial heat of the hot-bed. Laſtly, to all this I would add that other chearful vehicle, light, which the gloomy and torpent North is ſo many months deprived of, the too long ſeclusion whereof is injurious to our exotics kept in the conſervatories; ſince however tempered with heat, and duly refreſhed, they grow ſickly, and languiſh without the admiſſion of light as well as air, as I have frequently found. *

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* If any number of plants are placed in pots in a room which only admits the light by a ſingle hole, the ſtems will incline, or direct themſelves towards that ſide. In thick foreſts, the young trees always lean to the ſide where the light penetrates. The new ſhoots of an eſpalier detach themſelves from the wall which robs them of the air, the ſun, and the light. It is in queſt of the ſame excellent gifts of nature, that the lateral branches of trees abandoning the direction of the ſtem, ſpread and extend themſelves in a direction parallel to the ſoil, even when planted on a declivity. Trunks are not, however, the only parts of plants which direct their courſe towards the air and the light of the ſun. There are flowers, which, quitting their perpendicular direction, preſent their ſurface directly to that luminous body, and follow it in its diurnal courſe. This ſort of motion has been called by ſome writers, NUTATION; and the plants which are ſubject to it, have been termed *Heliotropæ*; that is, turning with the ſun. The ſtory of the ſun-flower, in Ovid's Metamorphoſes, is confirmed by daily obſervation. Thomſon beautifully deſcribes its affection:

> But one, the lofty follower of the ſun,
> Sad when he ſets, ſhuts up her yellow leaves,
> Drooping all night; and, when he warm returns,
> Points her enamour'd boſom to his ray.

Moſt of the diſcous flowers, by ſome power unknown to us, follow the ſun in his courſe. They attend him to his evening retreat, and meet his riſing luſtre in the morning with the ſame conſtant and unerring law.

CHAP. II.

Of the SEMINARY; *and of* TRANSPLANTING.

BOOK I. SEMINARY

1. *QUI vineam, vel arbuſtum conſtituere volet, Seminaria prius facere debebit*, was the precept of *Columella*, (de Arb. c. i.) ſpeaking of vineyards and fruit-trees; and doubtleſs we cannot purſue a better courſe for the propagation of timber-trees: For though it ſeem but a trivial deſign, that one ſhould make a nurſery of foreſters; yet it is not to be imagined, without the experience of it, what prodigious numbers a very ſmall ſpot of ground, well cultivated, and deſtined for this purpoſe, would be able to furniſh towards the ſending forth of yearly colonies into all the naked quarters of a Lordſhip or Demeſne; being, with a pleaſant induſtry, liberally diſtributed amongſt the tenants, and diſpoſed of about the hedge-rows, and other waſte and uncultivated places for timber, ſhelter, fuel, and ornament, to an incredible advantage. This being a cheap and laudable work, of ſo much pleaſure in the execution, and ſo certain a profit in the event to be but once well done (for, as I affirmed, a very ſmall plantarium, or nurſery, will, in a few years, ſtock a vaſt extent of ground) hath made me ſometimes in admiration at the univerſal negligence, as well as raiſed my admiration, that ſeeds and plants of ſuch different kinds, ſhould, like ſo many tender babes and infants, ſuck and thrive at the ſame breaſts; though there are ſome indeed will not ſo well proſper in company, requiring peculiar juices: But this niceneſs is more conſpicuous in flowers, and the herbaceous offspring, than in foreſters, which require only diligent weeding and frequent cleanſing, till they are able to ſhift for themſelves; and as their veſſels enlarge and introſume more copious nouriſhment, they often ſtarve their neighbours. Thus much for the Nurſery and Conſeminea Silva.

2. Having therefore made choice of ſuch ſeeds as you would ſow, by taking and gathering them in their juſt ſeaſon, that is, when dropping ripe, and, as has been ſaid, from fair thriving trees, and found out ſome fit place of ground, well fenced, reſpecting the ſouth-eaſt, rather than the full ſouth, and well protected from the north and weſt, let it be broken

up the winter before you ſow, to mellow it; eſpecially if it be a clay, and then the furrow ſhould be made deeper, or ſo at leaſt as you would prepare it for wheat: Or you may trench it with the ſpade, by which means it will the eaſier be cleanſed of whatſoever may obſtruct the putting forth, and inſinuating of the tender roots. CHAP. I.

Qui ſerere ingenuum volet agrum,
Liberat prius arva fruticibus;
Falce rubos, filicemque reſecat. BOETH. lib. ii. *Met.*

He that for wood his field would ſow,
Muſt clear it of the ſhrubs that grow;
Cut brambles up, and the fern mow.

Having given it a ſecond ſtirring, immediately before you ſow, caſt and diſpoſe it into rills, or ſmall narrow trenches, of four or five inches deep, and in even lines, at two feet interval, for the more commodious runcation, hawing, and dreſſing the trees: Into theſe furrows, about the new or increaſing moon, throw your Oak, Beech, Aſh, Nuts, all the glandiferous ſeeds, maſt and key-bearing kinds, ſo as they lie not too thick, and then cover them very well with a rake, or fine-toothed harrow, as they do for peaſe: Or, to be more accurate, you may ſet them as they do beans, eſpecially the Nuts and Acorns, and that every ſpecies by themſelves, for the Roboraria, Glandaria, Ulmaria, &c. which is the better way *: This is to be done at the latter end of October, for the autumnal ſowing, and in the lighter ground about February, for the vernal. For other ſemina-

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* The moſt natural, direct, and general way of raiſing trees and plants is from ſeeds. In order to this, proper ſoils muſt be prepared for them, as ſuitable as poſſible to their reſpective natures; and when the ground is ready, and properly furniſhed with the embryo plants, it is properly and ſignificantly called the Seminary. The ſize of the ſeminary ſhould be in proportion to the quantity of ſeeds to be raiſed; the land ſhould be good, and the ſituation ought to be warm, and well defended; for many trees, though hardy enough afterwards, are nevertheleſs frequently tender when young. The ſituation of the ſeminary ſhould be as near the nurſery as poſſible; though if this is not convenient, neither the ſeminary nor the nurſery need be ſtationed near the houſe or other works: Let, therefore, a fertile mead or rich paſture, lowly ſituated, be ſought after for the purpoſe, in a place not conſpicuous to the view from any part of the pleaſure-garden, if poſſible; and if this cannot be had, let it be intercepted with trees, ſtationed a little either on one or both ſides at pleaſure, ſo as to give it the

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Proinde nemus ſparſa cures de glande parandum:
Sed tamen ante tuo mandes quam ſemina campo,
Ipſe tibi duro robuſtus vomere foſſor
Omne ſolum ſubigat late, explanetque ſubactum.
Cumque novus fiſſo primum de germine ramus
Findit humum, rurſus ferro verſanda bicorni
Conſita vere novo tellus, cultuque frequenti
Exercenda, herbæ circum ne forte nocentes
Proveniant, germenque ipſum radicibus urant.
Nec cultu campum cunctantem urgere frequenti,
Et ſaturare fimo pudeat, ſi forte reſiſtat
Culturæ: nam triſtis humus ſuperanda colendo eſt.

RAPINUS.

Then ſee your hopeful grove with Acorns ſown;
But e'er your ſeed into the field be thrown,
With crooked plow firſt let the luſty ſwain
Break up, and ſtubborn clods with harrow plane:
Then, when the ſtem appears, to make it bare,
And lighten the hard earth with hough, prepare:
Hough in the ſpring, nor frequent culture fail,
Leſt noxious weeds o'er the young wood prevail.
To barren ground with toil large manure add;
Good huſbandry will force a Soil that's bad.

Note, that ſix buſhels of Acorns will ſow or plant an acre at one foot's diſtance: And if you mingle amongſt the Acorns the ſeeds of Geniſta

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appearance of a plantation. I chooſe to have the ſeminary low, becauſe theſe ſituations are always the warmeſt, and it will receive additional warmth from the trees intended to conceal it; and I recommend it to be a rich ſoil, becauſe the ſeeds will grow better in it, and will make finer trees afterwards; ſo that when the ſituation is not well defended, nor the ſoil rich, the one muſt be aſſiſted with plantations of hedges and trees all round it, and the other by the addition of good rotten dung.——Having fixed

Spinoſa, or Furze, they will come up without any damage, and for a while prove a ſufficient fence, and will be killed by the ſhade of the young Oak-lings, before they become able to do them any prejudice. CHAP. II.

One rule I muſt not omit, that you caſt no ſeeds into the earth whilſt it either actually rains, or that it be over ſobbed, till moderately dry.

To this might ſomething be expected concerning the watering of our Seminaries and new Plantations; which indeed require ſome uſeful directions (eſpecially in that you do by hand) that you pour it not with too great a

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upon the place for the ſeminary, let it be double dug, working the ſward to the bottom; nevertheleſs, if the ſoil be too ſhallow for double digging (for you ought not to go below the depth of the natural mould) you muſt be content with digging it only a ſpit and a half deep. We may ſuppoſe this work to be done in the winter. In the ſpring, as the weeds ariſe, they muſt be conſtantly kept down; and about Midſummer, if the ſoil is not naturally very rich, ſome rotten dung ſhould be ſpread all over the ſurface of the ground, which ſhould be then trenched or double dug afreſh. The ſward by this time will be rotten; and by bringing it up to the ſurface, it will be reduced to a finer mould, and better qualified to anſwer the purpoſes it is deſigned for in the autumn. From Midſummer until September the ground muſt be kept clean from weeds; and juſt before the ſeeds are committed to it, it ſhould be double dug afreſh. At this time the parts muſt be wholly incorporated; the rotten dung found at the bottom muſt not be made wholly to occupy the top; neither muſt the rotten turf at top be laid all in the bottom; but the whole muſt be mixed as equally as poſſible; which may very eaſily be done, though double dug, by the careful attention of the perſon employed about this buſineſs. When this is done, the ground muſt be levelled, and the beds laid out for the different purpoſes wanted; reſerving, nevertheleſs, ſuch a proper portion of it as will be wanted for the reception of thoſe ſeeds which are to be ſown in the ſpring.—The ſeminary muſt be divided into different apartments, for the different ſorts of ſeeds, according to their nature: Thoſe ſeeds that are to be ſown in autumn ſhould be in a part by themſelves; thoſe in the ſpring in another. Theſe alſo muſt again be ſeparated: Seeds which remain until the ſecond ſpring before they come up, ſhould be all ſown in beds contiguous to each other; and thoſe alſo which often continue three years, muſt be ſown by themſelves, that the whole ſpot may be kept ſeparate, entire, clean from weeds, and the dormant ſeeds no way incommoded by the trampling of labourers, and perſons employed in aſſiſting in the proper management of thoſe plants which have come up from ſeeds the firſt ſpring. Soon after any of the apartments have performed their office of exhibiting the plants, and theſe are all taken off for the nurſery, the ground ſhould be double dug, and lie fallow the ſummer following, manuring it with rotten dung, and double digging it about Midſummer, as

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ſtream on the ſtem of the plant, which waſhes and drives away the mould from the roots and fibres; but at ſuch diſtance as it may percolate into the earth, and carry its virtue to them, with a ſhallow excavation, or circular baſin, about the ſtalk; and which may be defended from being too ſuddenly exhauſted and drunk up by the ſun, and taken away before it grow mouldy. The tender ſtems and branches ſhould yet be more gently refreſhed, leſt the too intenſe rays of the ſun darting on them, cauſe them to wither, as we ſee in our fibrous flower-roots newly ſet: In the mean time, for the more ample young plantations of foreſt and other trees, I ſhould think the hydraulick engine called the *Quench-fire*, (deſcribed in the Phi-

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before. In the autumn it will be ready to be ſown afreſh; but this ſhould always be with ſeeds of a different nature from thoſe by which it was before occupied.——One caution, however, ought to be obſerved from the firſt ſetting off, or at leaſt from the firſt ſowing of the ſeeds: If rabbits or hares abound in or about the place where the Seminary is deſigned, it ſhould be fenced with pales, walls, or any other fence, to keep them out, otherwiſe they will cauſe great devaſtation, by devouring the ſeedlings as they come up, or will ſo crop and ſtunt them, as that many of them will hardly ever become good trees afterwards.

The Seminary being now ready, it follows that the planter ſhould be inſtructed in the manner of ſowing and raiſing the ſeeds of foreſt-trees; and as Bradley, Miller, Hanbury, and Weſton have publiſhed uſeful directions upon this head, I flatter myſelf that I ſhall be thought right in tranſcribing their authorities for the manner of raiſing the following trees from ſeed.

OAK.

The Oak, the Pride and Glory of the Foreſt, is an indigenous tree of this country, and ſuits itſelf to all ſorts of ſoils. It is of ſlow growth; but its cultivation is of the utmoſt conſequence to this nation.——In order to raiſe this tree, let the acorns be procured from ſtraight thriving trees, when they are full ripe and begin to fall. In February or March (or in October, if autumnal ſowing be more agreeable) prepare the beds four feet wide; rake the earth out into the alleys two inches deep, and draw lines acroſs the bed at four inches aſunder by a ſharp-edged ſtick; on theſe lines lay the acorns at about three inches diſtance from each other; when the bed is finiſhed, preſs the ſeeds gently down with the back of the ſpade to keep them in their places, then ſpread the earth over them two inches thick, and rake the beds even; by their being planted in rows four inches aſunder, a two-inch hoe can paſs betwixt the rows without hurting the plants, by which the weeds are more eaſily deſtroyed, and the ſtirring the earth ſo much will cauſe the plants to grow the more, which advantage is loſt if they are ſown broadcaſt. It will be neceſſary to place ſome traps in the alleys to catch the mice, particularly after autumnal ſowing; the crows alſo are very fond of acorns; therefore it will be proper to guard againſt theſe

loſophical Tranſactions, number 128.) might be made very uſeful, if rightly managed, and not too violently pointed againſt any ſingle trees, but ſo exalted and directed, as the ſtream being ſpread, the water might fall on the ground like drops of rain; which I ſhould much prefer before the barrels and tumbral way. Rain, river, or pond-waters, reſerved in tubs or ciſterns, ſimple or enriched, and abroad in the ſun, ſhould be frequently ſtirred, and kept from ſtagnation.

4. Your plants beginning now to peep, ſhould be earthed up, and comforted a little, eſpecially after breaking of the greater froſts, and when

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enemies, or all your labour will be loſt.—For two years the plants may remain in the ſeed-bed, with only the care of weeding them conſtantly in ſummer, and ſpreading a little freſh earth and aſhes among them againſt the winter, till they are two years old. They muſt then be tranſplanted, in March or October, either where they are to remain, or elſe into the nurſery; if into the nurſery, it muſt be in rows two feet and a half aſunder, and each tree at eighteen inches diſtance, where they muſt be conſtantly hoed, and the ground dug between them before winter, till they are planted out for timber.

ELM.

The Wych Elm is the only one that ripens its ſeeds well in this country. It muſt be gathered the beginning of June, laid in a dry place for a few days, and then it will be fit to ſow. After having formed the beds four feet wide, rake out the earth, about two inches deep, and ſift it into the beds again, except leaving about half an inch of it to cover the ſeeds with; rake it level again, and flat it a little with the back of the ſpade, then ſow the ſeeds, and ſift the remaining earth over them. When you have ſown the ſeeds, the beds muſt be hooped, and covered with mats to ſcreen them from the ſun; but when it rains, take them off; and if it be very dry weather, the beds muſt be frequently and gently watered.—In about a month, many of the young plants will appear; towards September the mats may be taken away, but before winter they muſt be well weeded, and a quarter of an inch of aſhes ſifted over them. At ſpring the reſt will appear, and during the ſummer they muſt be conſtantly weeded, frequently watered in dry weather, and have ſome earth ſifted over them. The February following they muſt be taken out of the ſeed-bed and planted in rows three feet aſunder, and each Elm at eighteen inches diſtance, where they are to remain with the uſual care of digging between the rows, and hoeing the weeds in ſummer.

BEECH.

Gather a ſufficient quantity of maſt, about the middle of September, when it begins to fall; ſpread it upon a mat, in an airy place, for ſix days, to dry; and after that you may either proceed to ſowing it immediately, or you may put it up in bags, in order

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the ſwelling mould is apt to ſpue them forth; but when they are about an inch above ground, you may, in a moiſt ſeaſon, draw them up where they are too thick, and ſet them immediately in other lines or beds prepared for them; or you may plant them in double foſſes, where they may abide for good and all, and to remain till they are of a competent ſtature to be tranſplanted; where they ſhould be ſet at ſuch diſtances as their ſeveral kinds require: but if you draw them only for the thinning of you Seminary, prick them into ſome empty beds (or a plantarium purpoſely deſigned) at one foot interval, leaving the reſt at two or three.

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to ſow it nearer the ſpring; which method I would rather adviſe, as it will keep very well, and there will be leſs danger of having it deſtroyed by mice or other vermin, by which kinds of animals theſe ſeeds are greatly reliſhed. The ground being ready for the ſeeds, line your beds out four feet wide, with alleys at a foot and a half or two feet broad, for this is the propereſt width for raiſing the ſeeds of all ſorts of foreſt-trees; let the earth be raked out of each bed, one inch deep; and, after having levelled the bottom, and gently tapped it down with the ſpade, ſow the ſeeds all over it, even and regular; then tap them down with the back of the ſpade, and cover the mould over them an inch deep. In the ſpring of the year, many of the young plants will make their appearance, whilſt others will not come up till the ſpring following.—After they have been two years in the ſeminary, they muſt be planted in the nurſery way on ſome double-dug ground. The rows ſhould be two feet and a half aſunder, and the plants at eighteen inches diſtance in the rows. The rows ought to be kept clean of weeds in the ſummer, and dug between every winter. Here they may remain till they are to be planted out for continuance.

ASH.

Procure the keys from healthy young thriving trees in October or November; rake ſome of the earth off into the alleys, to lower the bed about an inch; ſow the keys moderately thick, then throw the earth back again lightly with a ſpade, or elſe ſift it over them, an inch thick, and rake it level; at ſpring with a very ſmall light iron rake, (the teeth about one inch aſunder) rake off the moſs, pull up the weeds, and ſift a little earth over them again; they will want no other care the firſt year, except weeding. The ſecond ſpring, in the firſt open weather in February, rake off very gently the earth as before, ſift freſh over them, about half an inch thick, and in March and April the young plants will appear in plenty. During the ſummer they muſt be conſtantly weeded, and in very dry weather, now and then watered; in October weed them again, and ſift ſome coal-aſhes half an inch thick over them; but if the heavy rains in the ſummer have laid the roots bare, it will be neceſſary to ſift a little earth amongſt them firſt. No perſons, unleſs they have practiſed this method of ſifting earth and aſhes over their ſeedling plants before winter, can conceive the advantage they receive from it; it ſtrengthens the ſtems, prevents moſs from growing amongſt

5. When your ſeedlings have ſtood thus till June, beſtow a ſlight digging upon them, and ſcatter a little mungy half-rotten litter, fern, bean-haume, or old leaves among them, to preſerve the roots from ſcorching, and to entertain the moiſture; and then in March following (by which time it will be quite conſumed, and very mellow) you ſhall chop it all into the earth, and mingle it together: Continue this proceſs for two or three years ſucceſſively, for till then the ſubſtance of the kernel will hardly be ſpent in the plant, which is of main import; but then (and that the ſtature of your young imps invite) you may plant them forth, carefully taking up their roots, and cutting the ſtem within an inch of the ground,

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them, and ſecures them from being turned out of the ground by the froſt. The next ſpring prepare ſome beds ſix feet wide, with a path of two feet betwixt each; plant all of a ſize in each bed, at one foot ſquare, firſt ſhortening the tap-roots and alſo the ſide ones; in this bed they muſt remain for two years, hoeing the ground when any weeds appear, and againſt winter ſprinkling a few aſhes amongſt them.—— After ſtanding at this diſtance for two years, they will want removing; they muſt then be planted out into your nurſery, in rows three feet aſunder, and each plant at one foot diſtance, where they are to remain till they are wanted for planting out for good, or for ſelling; but obſerve to keep the weeds conſtantly down when ſmall, for then a labourer with a Dutch hoe can clean near half an acre in a day, and your trees will thrive amazingly by ſuch a practice.

LARCH.

In the winter let a ſufficient quantity of cones be procured, and kept till the ſpring of the year. Juſt before ſowing, let them be opened or torn into four quarters by a knife, the point of which muſt be thruſt exactly down the centre, ſo that the ſeeds in their reſpective places may not be damaged. Formerly, great pains were beſtowed in getting at the ſeeds, by cutting off the ſcales of the cones ſingly, and letting the ſeeds drop. This occaſioned great expence to thoſe who wanted a quantity of ſeeds; ſo that it is now wholly laid aſide, for the more eaſy method of opening them with knives, and then threſhing them. A certain price is generally allowed per thouſand to the poor for opening them. When a ſufficient quantity is opened, they ſhould be threſhed in a room, which will divide the ſcales, and diſlodge the ſeeds, without injuring many of them. Three thouſand cones will generally produce about a pound of good ſeeds. The cones being ſufficiently broken, and the ſeeds threſhed out, they ſhould be winnowed or ſieved, to have clear ſeeds; after which they will be ready for ſowing in April.—— Let the ſeminary conſiſt of a ſpot of fine light earth, and let the ſeeds be ſown in beds a quarter of an inch deep. After the plants have made their appearance, they ſhould be gently refreſhed with water in dry weather, and carefully kept clean of weeds during the whole ſummer. By the autumn they will not have ſhot more than an inch or two; and in ſpring they ſhould be pricked out in beds about three inches aſunder. The

BOOK I. (if the kind, of which hereafter, ſuffer the knife) ſet them where they are to continue: If thus you reduce them to the diſtance of forty feet, the intervals may be planted with Aſh, which may be felled either for poles or timber, without the leaſt prejudice to the Oak: Some repeat the cutting, we ſpake of, the ſecond year, and after March (the moon decreaſing) recut them at half a foot from the ſurface, and then meddle with them no more: But this (if the proceſs be not more ſevere than needs) muſt be done with a very ſharp inſtrument, and with care, leſt you violate and unſettle the root; which is likewiſe to be practiſed upon all thoſe which you did not tranſplant, unleſs you find them very thriving trees; and then it ſhall

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ſecond ſpring they muſt be taken out of theſe beds with care, and planted in the nurſery in rows three feet aſunder, and the plants eighteen inches from each other; and here they may remain until they are fit to plant out for good, which will be about the ſecond or third year after.—If they grow well in the nurſery, I would adviſe to plant them where they are to continue, after having attained two years ſtrength in that place, if the ground can poſſibly be prepared for their reception; ſince theſe trees always thrive beſt when removed ſmall from the nurſery, if they are of a ſufficient ſize not to be injured by the weeds; if they are ſmaller, the owner muſt keep them clean.

CHESNUT.

Before you attempt planting any Cheſnuts, whether foreign or Engliſh, put them into a tub of water, and if any ſwim they are not good. The middle of February draw four drills along each bed at a foot diſtance and five inches deep; place the nuts in them at about four inches aſunder, and cover them well over; as the plants appear, weed them very carefully, and if you make uſe of an hoe, it muſt be done with great care, for fear of hurting the tender bark; but if any weeds break off within ground, a carpenter's chiſſel, about an inch broad, will be of great uſe in getting the roots up without damaging the plants. In this ſeminary they muſt ſtand two years, be well weeded and earthed up before winter, and then ſome aſhes ſpread amongſt them. In February they will want tranſplanting into the nurſery (the ground being firſt double dug) in rows three feet aſunder, and each plant at eighteen inches diſtance; after they have remained there another year, cut them all down to the ground, by which they will ſhoot very ſtrongly with handſome ſtraight ſtems, and overtake others which have not been cut down. Here they may remain four or five years, keeping them clean from weeds, and digging between the rows.

WALNUT.

Having marked the trees that produce the fineſt nuts, either for thinneſs of ſhell or goodneſs of taſte, we muſt proceed to gather them when they begin to fall. But as collecting them by the hand would be tedious, they may be beat down by long poles prepared for that purpoſe. Having procured the quantity wanted, let

ſuffice to prune off the branches, and ſpare the tops; for this does not only greatly eſtabliſh your plants, by diverting the ſap to the roots, but likewiſe frees them from the injury and concuſſions of the winds, and makes them to produce handſome, ſtraight ſhoots, infinitely preferable to ſuch as are abandoned to nature and accident, without this diſcipline: By this means the Oak will become excellent timber, ſhooting into ſtraight and ſingle ſtems: The Cheſnut, Aſh, &c. multiply into poles, which

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them be preſerved, with their huſks on, in ſand, till the beginning of February, which is the time for planting them. This is to be done in the following manner: Let drills be made acroſs the ſeminary, at one foot aſunder, and about two inches and a half deep, and let the nuts be put into them at the diſtance of about one foot. In the ſpring the young plants will come up; and here they ſhould continue for two years, being conſtantly kept clear of weeds; when they will be of a proper ſize to plant out in the nurſery. The ground ſhould be prepared, as has been always directed, by double digging; and the trees being taken out of the ſeminary, and having their tap-roots ſhortened, ſhould be planted therein, in rows two feet and a half aſunder, and the plants at a foot and a half diſtance. Here they may remain, with the ſame culture as has been all along directed for the management of timber-trees, till they are of a proper ſize for planting out for good.—If they are deſigned for ſtandards to be planted in fields, &c. before they are taken out of the nurſery they ſhould be above the reach of cattle, which may otherwiſe wantonly break their leading ſhoots, though they do not care to eat them, on account of their extraordinary bitterneſs. They ought likewiſe to be removed with the greateſt caution, and the knife ſhould be very ſparingly applied to the roots. They muſt alſo be planted as ſoon as poſſible after taking up; and this work ſhould be always done ſoon after the fall of the leaf, in the manner that will be directed for planting out ſtandard timber-trees.—If theſe trees are intended to form a wood, for which purpoſe they anſwer extremely well, I would adviſe to take them out of the nurſery when they are about three or four feet high, and to plant them about three yards aſunder; and, after their heads begin to touch, they ſhould be thinned. By this means, theſe large and branching trees will be drawn up, with a beautiful ſtem, to a great height. At the laſt thinning of the trees, the ſtandards ſhould be left at about thirty feet diſtance: But if the owner expects to reap the benefit of the fruit, the diſtance he ought to leave them ſhould be ſeven or eight feet more. Thus will the planter have a wood of walnuts every year rewarding him with its produce, (which is always ready money, being ſold to thoſe who ſupply the markets) till they are full grown to timber, and muſt be felled.

LIME.

Procure the ſeeds from the red-twigged Lime, by beating them down with a pole in October; ſpread them in a dry place for a few days before you ſow them: prepare your beds four feet wide, and rake the earth out about an inch deep; level the bed,

Book I. you may reduce to ſtandards at pleaſure. To this I add, that as oft as you make your annual tranſplanting out of the nurſery, by drawing forth the choiceſt ſtocks, the remainder will be improved by a due ſtirring and turning of the mould about their roots.

But that none be diſcouraged, who may, upon ſome accident, be deſirous or forced to tranſplant trees, where the partial or unequal ground does not afford ſufficient room or ſoil to make the pits equally capacious (and ſo

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and then ſow them about an inch aſunder, preſſing the ſeeds down gently with the back of the ſpade, and covering them. At ſpring they will appear, and muſt be conſtantly weeded and watered a little in very dry weather; before winter, ſift ſome aſhes over them to deſtroy the moſs; they muſt remain in the ſeed-bed two years, and then they will be fit to plant out into the nurſery in rows two feet and a half aſunder, and each tree at eighteen inches diſtance; but before they are planted, ſhorten the roots a little, and cut off any ſide-branches. In this manner they may remain for ſeveral years, (for they will bear removing at any ſize) with hoeing the weeds down in ſummer, and digging between them every year; but as you want them, it is better to take away every other tree, which will cauſe thoſe which remain to have more air, and thrive better.

HORSE-CHESNUT.

Put the nuts in a tub of water, and throw away all that ſwim; plant them in the ſame manner as the other Cheſnuts, except that they are better put in the ground in October, for if they are kept till ſpring many will miſcarry; but then it will be prudent to ſet ſome traps to catch mice, who are very fond of them. At ſpring they will appear, and when one year old they muſt be taken up, the tap-roots ſhortened, and then planted in the nurſery, in rows three feet aſunder, and each plant at eighteen inches diſtance: but there is this difference from the other Cheſnuts, that theſe make their whole ſhoot in about three weeks or a month's time, and after that only increaſe in thickneſs; therefore during that period it would certainly forward them to give the ground an hoeing, though it was dug in the ſpring; and if the beginning of May ſhould prove dry, which it ſometimes does, to water them two or three times would not be improper.—Be careful not to prune theſe trees after they are planted, for they will not bear it; and their own beautiful natural ſhape indicates, that they want no aſſiſtance from art.

SYCAMORE.

In the autumn, when the keys are ripe, they may be gathered, and in a few days after ſown, as has been directed for the aſh, &c. In the ſpring the plants will appear, and make a ſhoot of about a foot and a half by the autumn following, if the ground of the ſeminary be tolerably good, and they are kept clean from weeds. The ſpring after they come up, they ſhould be planted in the nurſery, in rows two feet and a half aſunder, and their diſtance in the rows muſt be one foot and a half. Here they may

apt to nouriſh and entertain the roots, as where are no impediments) the worthy Mr. Brotherton, (whom we ſhall have occaſion to mention more than once in this treatiſe) ſpeaking of the increaſe and improvement of Roots, tells us of a large Pinaſter, two feet and a half in diameter, and about ſixty feet in height, the loweſt boughs being thirty feet above the ground, which did ſpread and flouriſh on all ſides alike, though it had no root at all towards three quarters of its ſituation, and but one quarter only into which it expanded its roots ſo far as to ſeventy and eighty feet from the body of the tree: The reaſon was, its being planted juſt within the ſquare angle of the corner of a deep, thick, and ſtrong ſtone-wall, which was a kind of wharfing againſt a river running by it, and ſo could have nouriſhment but from one quarter. And this I likewiſe might confirm of two Elms, planted by me about thirty-five years ſince; which being little

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remain till they are big enough to plant out for good, with no farther trouble than taking off unſightly ſide-branches, and ſuch as have a tendency to make the tree forked, except digging between the rows, which muſt always be done every winter.

MAPLE.

If a quantity of theſe trees are wanted, they may be raiſed in the ſame manner as the Sycamore, and managed accordingly.

MULBERRY.

This tree is propagated two ways; from ſeeds, and by layers. Where the former can be procured, it is the moſt expeditious way of raiſing great quantities; and whoever has a correſpondence in the ſouth of France, or in Italy, may, through that channel, obtain them. Having the ſeeds ready, let a fine warm border of rich mellow earth be prepared; and let this border be hooped, in order to ſupport mats to defend the young plants, when they appear, from froſts. If no ſuch border can be eaſily had, it will be proper to make a gentle hot-bed, and cover it with rich fat mould: This alſo muſt be hooped as the border. Then ſow the ſeeds in little drills, about a quarter of an inch deep. The middle of March is the beſt time for this work; and when the young plants appear, which will be in about ſix weeks, they muſt be conſtantly covered with the mats in the night, if any appearance of froſt preſents itſelf, as there often is at that ſeaſon. During the ſummer they ſhould be kept clear from weeds, and covered from the extream heat of the ſun while the hot months continue. Whenever any cloudy or rainy weather approaches, the mats ſhould be always taken off, that the plants may enjoy the benefit of it. By thus carefully nurſing the beds, keeping them clear from weeds, watering the plants in dry ſeaſons, covering them from the parching ſun, and uncovering them again in the night, cloudy or rainy weather, the plants by autumn will be got pretty ſtrong; though not ſo ſtrong as to be left to them-

Book I. bigger than walking-ſtaves, and ſet on the very brink of a ditch or narrow channel, not always full of water, wharfed with a wall of a brick and half in thickneſs to keep the bank from falling in, are ſince grown to goodly and equally ſpreading trees, of near two feet diameter ſolid timber, and of ſtature proportionable. The difference between theſe, and that of the Pine, being their having one quarter more of mould for the roots to ſpread in; but which is not at all diſcovered by the exuberance of the branches in either part.—But to return to planting where are no ſuch obſtacles.

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ſelves. The following winter they will require ſome care. When the froſts approach, they muſt be carefully covered with the mats, as in the ſpring; for without this protection many of them would be injured, and the greateſt part killed, at leaſt down to the ground. In this bed they may ſtand two years, when they will be ſtrong enough to plant out in the nurſery. The ground for this purpoſe being double dug, the young plants ſhould be ſet in rows, at two feet and a half diſtance, and one foot and a half aſunder in the rows. There they may remain till they are of a ſufficient ſize to plant out for good.

HORNBEAM.

In the autumn the ſeeds are ripe; when, having gathered a ſufficient quantity for the purpoſe, let them be ſpread upon a mat a few days to dry. After this, they ſhould be ſown in the ſeminary, in beds four feet wide, with an alley of about two feet, in the manner directed for raiſing the Aſh. In this bed they will remain till the ſecond ſpring before they make their appearance; and all the ſummer they lie concealed, the weeds ſhould conſtantly be plucked up as ſoon as they peep; for if they are neglected they will get ſo ſtrong, and the fibres of their roots will be ſo far ſtruck down among the ſeeds, as to endanger the drawing many ſeeds out with them, on weeding the ground. After the young plants appear, they ſhould conſtantly be kept clear of weeds during the next ſummer; and if they were to be now and then gently refreſhed with water in dry weather, it would prove ſerviceable to them. In the ſpring following they may be taken out of theſe beds, and planted in the nurſery.

MOUNTAIN ASH, OR QUICKEN-TREE.

Having procured a ſufficient quantity of berries, they ſhould be ſown, ſoon after they are ripe, in the ſeminary, about half an inch deep, in beds made as has been before directed. They frequently lie till the ſecond ſpring before they make their appearance; and in the ſpring following may be planted out in the nurſery.

BIRCH.

The common Birch is raiſed from ſeeds, and the varieties are continued by layers. The ſeeds ſhould be gathered in the autumn before they drop from their ſcales, which will happen ſoon after they begin to open. In a day or two they ſhould be ſown in the ſeminary, in a ſuperficial manner; and after they are come up, the plants ſhould

6. Theophraſtus, in his third book de Cauſis, cap. vii. gives us great caution in planting to preſerve the roots, and eſpecially the earth adhering to the ſmalleſt fibrils, which ſhould by no means be ſhaken off, as moſt of our gardeners do, to trim and quicken them, as they pretend, which is to cut them ſhorter (though I forbid not a very ſmall topping of the ſtraggling threads, which may elſe hinder the ſpreading of the reſt) not at all conſidering that thoſe tender hairs are the very mouths and vehicles which ſuck in the nutriment, and transfuſe it into all the parts of the tree; and that theſe once periſhing, the thicker and larger roots, hard and leſs ſpungy, ſignify little but to eſtabliſh the ſtem; as I have frequently experimented in Orange-trees, whoſe fibres are ſo very obnoxious to rot, if they take in the leaſt exceſs of wet: And therefore Cato adviſes us to take care that we bind the mould about them, or transfer the roots in baſkets, to preſerve it from forſaking them; as now our nurſery-men frequently do, by which they of late are able to furniſh our grounds, avenues, and gardens in a moment with trees and other plants, which would elſe require many years to appear in ſuch perfection: For this earth being already applied, and fitted to the apertures and mouths of the fibres, it

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be carefully kept clear of weeds for the firſt ſummer. The ſpring following they may be planted out in the nurſery: The rows muſt be two feet and a half aſunder, and the plants a foot and a half diſtant in the rows. Here they may continue till they are of a ſufficient ſize to be planted out where they are to remain.

SCOTCH FIR.

The Scotch Fir is propagated by ſeeds, of which their cones afford great plenty. In order to get them out, the cones, which muſt be gathered in winter, ſhould be preſerved till the month of June, when they ſhould be occaſionally brought forth, and expoſed to the utmoſt heat of the ſun: This will occaſion their ſcales to open, ſo that the ſeeds will eaſily ſhake out. A large carpet or oil-cloth is a very proper thing to lay them on, which will ſave the ſeeds that drop by turning the cones; for as often as the ſcales on one ſide of them are opened, the other ſide ſhould be turned to the ſun, to receive the ſame effect.—This is the method of procuring great quantities of theſe ſeeds, which will be ready to ſow the ſpring following. But when numbers of theſe cones are obtained, and a gentleman, having his ground ready for their reception, is unwilling to wait another year before he ſows his ſeeds, as there will be little ſun by the time they ſhould be ſown, the cones may be laid before a gentle fire at ſome diſtance, which will occaſion their ſcales to open, and the ſeeds to fall out of their cells. However, this manner of procuring the ſeeds is not ſo good as the former; becauſe ſome of them will be in danger of being ſcorched, though the utmoſt care be

Book I. will require ſome time to bring them in appetite again to a new mould, by which to repair their loſs, furniſh their ſtock, and proceed in their wonted œconomy, without manifeſt danger and interruption: Nor leſs ought our care to be in the making and dreſſing of the pits and foſſes into which we deſign our tranſplantation, which ſhould be prepared and left ſome time open to macerating rains, froſts, and ſun, that may reſolve the compacted ſalt, (as ſome will have it) render the earth friable, mix and qualify it for aliment, and to be more eaſily drawn in and digeſted by the roots and analogus ſtomach of the trees: This, to ſome degree, may be artificially done, by burning of ſtraw in the newly-opened pits, and drenching the mould with water, eſpecially in over dry ſeaſons, and by meliorating barren ground with ſweet and comminuted lætations. Let therefore this be received as a maxim, never to plant a fruit or foreſt-tree where there has

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taken; ſo that I would adviſe, when it is practiſed, not to wait till all the ſcales of each cone are opened, but, as ſoon as a few begin to gape, to beat out what ſeeds you can, and then proceed to the next in like manner, till you have got ſeeds ſufficient. By this means the fire will not have time to injure the ſeeds, and you may be certain of what you have being pretty good. Here I take it for granted you are not in want of cones: If there are but few cones, and many ſeeds are wanted, the additional labour of cutting off the ſcales cloſe to the centre muſt be applied.—But to proceed: Having obtained a quantity of good ſeeds, the beſt ſeaſon for ſowing them is the middle of April or May. The weather ought to be warm and dry at the time, and the mould fine and light. Beds ſhould be made in the ſeminary three or four feet wide, and the ſeeds muſt be ſown in theſe at a little more than a quarter of an inch in depth. In about ſix weeks the young firs will appear with the huſk of the ſeeds on their heads; and then is the time to watch them carefully; for if the ſparrows and other birds once take to them, they will deſtroy every plant as it comes up; nay, ſo fond are they of the huſks on the heads of the young plants, that, having once taſted them, no ſcarecrow will terrify them, or art keep them off. In order, therefore, to ſecure your crop of Firs, it would be proper to have them, ſoon after they are ſown, well netted, and ſtrings of ſewelling drawn acroſs, that, before they have any temptation, the birds may be frightened to other quarters, and the plants, at their firſt appearance, remain unnoticed by them. As ſoon as all the plants are come up, and have parted with the huſks from their heads, the nets and ſewelling may be taken off; for the ſeedlings will be then entirely out of danger.—All this ſummer they will need no farther care than being kept clean from weeds; and in the latter end of March, or beginning of April following, they ſhould be taken out of theſe beds, and pricked into others at three or four inches diſtance. At the time of their being firſt pricked out, being one year old from the ſeeds, you will find they have made no ſhoot, but are ſlender plants with ſmall weak eyes; and by the ſpring following, being two years from ſowing, few of them will have made a

lately been an old decayed one taken up, till the pit be well ventilated and furniſhed with freſh mould. CHAP. II.

7. Pliny, the author of the Natural Hiſtory, tells us, it was a vulgar tradition in his time, that no tree ſhould be removed under two years old, or above three. Cato would have none tranſplanted leſs than five fingers in diameter; but I have ſhewed why we are not to attend ſo long for ſuch as we raiſe of ſeedlings: In the interim, if theſe directions appear too buſy or operoſe, or that the plantation you intend be very ample, a more compendious method will be the confuſed ſowing of Acorns, &c. in furrows, two feet aſunder, covered at three fingers depth, and ſo for three years cleanſed, and the firſt winter covered with fern without any farther culture,

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ſhoot, but they will have employed this ſummer in ſtrengthening the eye in order to make a bold puſh the ſummer enſuing, which will be in height about half a foot. The ſpring after, they ſhould undergo a ſecond removal into the nurſery, where they ought to be planted a foot aſunder, and at two feet diſtance in the rows; and this ſummer they will have ſhot another half foot. In the ſpring following, being now four years old, and one foot in height, if the ground deſigned for the plantation be ready, and there are no rabbits or hares, they may be planted out for good. But where theſe animals can get to them, I would adviſe their remaining in the nurſery another year or two, till they are out of their reach; as I have frequently known plantations of theſe ſmall plants wholly deſtroyed, the winter after planting, by hares, &c. If, therefore, they are ſuffered to remain another year in the nurſery, having acquired ſtrength of body, they will make a ſhoot that ſummer of near two feet; ſo that the plants, at five years old, will be about a yard high, which is a good ſize for removing.—If they ſtand another year, till they are ſix years old, they will ſhoot about two feet more, and be near five feet in height. But here it is to be obſerved, that the larger theſe trees grow, the more difficulty there will be in removing them; and where they are of a tolerable height, many will be loſt in their removal, tho' the utmoſt care be taken.—Bleak and cold ſituations require the Firs to be planted from the ſeed-bed, of which a particular account will be given in the chapter upon the Fir.

WILD PINE.

This tree may be raiſed in the ſame manner as the Scotch Fir; and the cones ſhould be prepared, and the ſeeds obtained according to the directions given for that tree. They ſhould alſo be ſown at the ſame time; and in about ſix weeks the young plants will appear. They will make a ſhort ſhoot the firſt ſummer; and in the ſpring following they ſhould be pricked out in the nurſery, in beds at a foot aſunder each way. After your plants have taken to the ground, they will want no farther care than keeping them clean of weeds, till the latter end of September, or beginning of April follow-

Book I. unleſs you tranſplant them: But, as I ſhewed before in nurſeries, they ſhould be cut an inch from the ground, and then let ſtand till March the ſecond year, when it ſhall be ſufficient to diſbranch them to one only ſhoot, whether you ſuffer them to ſtand, or remove them elſewhere. But to make an eſſay what ſeed is moſt agreeable to the ſoil, you may, by the thriving of a promiſcuous ſemination, make a judgment of

Quid quæque ferat regio, & quid quæque recuſet.

What each ſoil bears, and what it does refuſe.

Tranſplanting thoſe which you find leaſt agreeing with the place, or elſe by copſing the ſtarvelings in the places where they are newly ſown, cauſe them ſometimes to overtake even their untouched contemporaries.

Something may here be expected about the fitteſt ſeaſon for this work
* Pomona. of tranſplanting; of which having ſpoken in another treatiſe *, as well as in divers other places throughout this of Foreſt-trees, I ſhall need add little, after I have recommended the earlieſt removals, not only of all the

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ing; in either of which months they ſhould be planted out for good, if poſſible; but if the ground cannot be got ready for their reception, they muſt undergo a ſecond removal in the nurſery way, otherwiſe they will moſtly die when planted out; for it is difficult to make this tree thrive when grown large, if it has not been uſed to conſtant moving.

WEYMOUTH PINE.

Weymouth Pines being the moſt beautiful and moſt valuable of all the different ſorts, every gentleman ſhould plant ſome of them; it is from theſe trees that our ſhips are furniſhed with maſts; the trees now produce good ſeeds here, therefore may be procured in greater plenty than they uſed to be; if theſe ſeeds are not ſown in boxes or pots, which is by much the beſt way, they muſt be covered by mats in the heat of the day, during the violent heat of the ſummer, and uncovered every night; but if ſown in pots or boxes, they may be more eaſily moved into the ſhade in ſummer, and brought back to a warmer ſituation in winter. April is the ſeaſon for ſowing theſe and other Pines.——After the plants are come up, ſift ſome earth amongſt them, if they appear weak or after heavy rains are beaten down, and before winter ſift ſome aſhes; then in ſpring plant them out into beds ſix feet wide, at eight inches aſunder each way: There let them remain two years, being conſtantly weeded, and the earth frequently ſtirred with a ſmall hoe, and before winter ſpread ſome aſhes amongſt them. The ſecond ſpring they muſt be planted out into rows, eighteen inches aſunder, and

ſturdy ſorts in our woods, but even of ſome leſs tender trees in our orchards, Pears, Apples, Vulgar Cherries, &c. whilſt we favour the delicate and tender Murals, and ſuch as are pithy, as the Walnut, and ſome others. But, after all, what ſays the plain Wood-man, ſpeaking of Oaks, Beech, Elms, Hawthorns, and even what we call Wild and Hedge fruit? "Set "them, ſays he, at All-hallon-tide, and command them to proſper; ſet "them at Candlemas, and intreat them to grow." Nor needs it explanation.

8. But here ſome may enquire what diſtances I would generally aſſign to tranſplanted trees: To this ſomewhat is ſaid in the enſuing periods, and as occaſion offers; though the promiſcuous riſing of them in foreſt-work, wild and natural, is to us, I acknowledge, more pleaſing than all the

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each row at three feet diſtance, where they may ſtand two or three years; and if they are not then intended to be planted out where they are to remain, they muſt be taken up, and planted again at two feet diſtance from each other, and the rows three feet aſunder. This tree will bear planting at ſix or eight feet high, without much danger, though not ſo many will live as if planted when only three feet high.

——— SWAMP PINE. ———

Its propagation is the ſame as the Weymouth Pine; and the planting out, and after-management of the trees, is alſo ſimilar.

——— STONE PINE. ———

The Stone Pine produces large eatable ſeeds, and from their ſize they can eaſily be planted at what diſtance you pleaſe. In ſpring make ſome drills an inch deep, and at ſix inches aſunder; in theſe plant the kernels about four inches from one another, and cover them with the earth near an inch thick; in dry weather they ſhould be gently watered after the plants appear, and kept clean from weeds until the following ſpring, when they ſhould be planted out in rows, two feet aſunder, and one foot in the rows, where they muſt continue two years; after that they muſt be removed to where they are to remain, for they will not bear tranſplanting large.

——— SPRUCE FIR. ———

In the beginning of April, having got the ſeeds out of the cones, which are very long, let them be ſown in a North border; for when they come up, by being conſtantly ſhaded all the ſummer in ſuch a ſituation, they will ſhoot much ſtronger, and be better to prick out the ſpring following in the nurſery. In about ſix or ſeven weeks after ſowing, the young plants will appear, when they ſhould be ſcreened with the uſual care from the birds, which otherwiſe would ſoon deſtroy them. By the autumn

BOOK I. ſtudied accuracy in ranging of them; unleſs it be where they conduct and lead us to avenues, and are planted for viſtas, (as the Italian term is) in which caſe, the proportion of the breadth and length of the walks, &c. ſhould govern, as well as the nature of the tree; with this only note, that ſuch trees as are rather apt to ſpread than mount, as the Oak, Beech, Walnut, &c. be diſpoſed at wider intervals than ſuch as grow beſt in conſort, as the Elm, Aſh, Lime-tree, Sycamore, Fir, Pine, &c. Regard is likewiſe to be had to the quality of the ſoil for this work: V. G. If trees that affect cold and moiſt grounds be planted in hot and dry places, then ſet them at cloſer order; but trees which love dry and thirſty grounds at farther diſtance. The like rule may alſo guide in ſituations

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many of theſe young plants, if they are kept clean from weeds and watered in dry weather, will have ſhot three or four inches; and in ſpring they ſhould be carefully taken out of their ſeed-beds, ſo that the fibres may by no means be broken off or injured. Being thus cautiouſly taken up, they ſhould be as carefully planted in the nurſery-ground, at the diſtance of one foot aſunder each way. Here they may continue, with keeping them free from weeds, for two or three years, when they ſhould be ſet out in the places where they are deſigned to remain.

SILVER FIR.

Theſe trees are raiſed by ſowing the ſeeds in a ſhady border, about the beginning of April. They will readily come up if the ſeeds are good; but as this is not often the caſe, eſpecially when procured from the ſeedſmen, they ſhould be ſown very cloſe, otherwiſe we may depend on having a very thin crop. The ſucceeding ſummer the plants will require no trouble, except keeping them clean from weeds; and the ſpring after that, they ſhould be pricked out in beds at about four inches diſtance from each other. There they may ſtand for two years, when they ſhould be planted in the nurſery, in rows a foot aſunder every way. The year, or at fartheſt two years, after they have been ſet in the nurſery, they ſhould be planted out for good; for if they are continued longer, many of them will die when planted out, and thoſe which grow frequently loſe their leading-ſhoot, or meet with ſo great a check as to be hardly able to get into a growing ſtate for ſeveral years.

STRAWBERRY TREE.

The Arbutus, or Strawberry Tree, is beſt propagated from ſeeds; therefore when the fruit is ripe it ſhould be gathered, and mixed with dry ſand to preſerve the ſeeds till the time of ſowing. Theſe ſeeds ſhould be ſown in pots, which ſhould be plunged into an old bed of Tanner's bark that has loſt its heat, covering the bed with glaſſes, &c. to keep out the froſt. This ſhould be done in December, and as the ſpring advances, if the pots are refreſhed with water, the plants will come up the beginning of April,

expoſed to impetuous winds and other accidents, which may ſerve for general rules in this piece of tactics. In the mean time, if you plant for regular walks, or any ſingle trees, a competent elevation of the earth in circle, and made a little hollow, like a ſhallow baſin, for the reception of water and refreſhing the roots, will be required; ſticking thorns about the edges, to protect them from cattle, were not amiſs. Fruit-trees, thus planted, may be ſet round with beans, which will produce a ſmall crop and ſhade the ſurface, perhaps, without detriment; but this more properly belongs to the garden. Moſt ſhrubs of Ever-green, and ſome trees, may be planted very near one another: Myrtles, Laurel,

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when they ſhould be frequently, but ſparingly, watered, and conſtantly kept clean from weeds.——As the ſummer advances, if the plants are ſhaded in the heat of the day, it will greatly promote their growth; but in warm weather they muſt be open all night to receive the dew, ſo ſhould only be covered in the middle of the day; with this management the plants will riſe to the height of five or ſix inches the firſt ſummer. The beginning of October, theſe plants may be ſhaken out of the pots, and their roots carefully ſeparated, planting them ſingly in ſmall pots filled with light earth; then plunge the pots into an old bed of tanners bark, under a common frame, obſerving to ſhade them from the ſun in the middle of the day, and to give them water as they may require: in this bed the pots ſhould remain during the winter, obſerving to expoſe the plants to the open air, at all times when the weather is favourable; but in froſty weather they muſt be covered, otherwiſe they will be in danger, if the ſeaſon prove ſevere. The ſpring following, the plants may be removed to a very gentle hot-bed, which will require no other covering but mats. This will enable them to make ſtrong ſhoots early in the ſummer, whereby they will be in a better condition to bear the cold of the ſucceeding winter: in this bed the plants may continue moſt part of the ſummer; for if the pots are taken out and ſet upon the ground, the ſmallneſs of their ſize will occaſion the earth in them to dry ſo faſt, that watering will ſcarcely preſerve the plants alive; but if they are kept growing all the ſummer, they will be more than a foot high by the next autumn: it will alſo be adviſeable to ſcreen them from the froſt during their continuance in pots, by plunging them into the ground in a warm place, and covering them with mats in bad weather.——When the plants are grown to be two or three feet high, you may ſhake them out of the pots, and plant them in the open ground in the places where they are to remain; but this ſhould be done in April, that they may have taken good root before the winter, which would be apt to damage them, if newly planted; and as all the earth about their roots may be thus preſerved, there will be no fear of ſucceeding at this ſeaſon.

Theſe obſervations upon ſowing are taken from approved Authors that have wrote for the Southern Parts of this Iſland, which may account for the great diſtances recom-

Book I. Bays, Cypreſs, Yew, Ivy, Pomegranates, and others, alſo need little diſtance, and indeed whatever is proper to make hedges; but for the Oak, Elm, Walnut, Firs, and the taller timber-trees, let the diſmal effects of the late hurricane, never to be forgotten, caution you never to plant them too near the manſion, or indeed any other houſe, that ſo, if ſuch accident happen, their fall and ruin may not reach them.

9. To leave nothing omitted which may contribute to the ſtability of our tranſplanted trees, ſomething is to be premiſed concerning their ſtaking, and ſecuring from external injuries, eſpecially from winds and cattle;

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mended in planting from the Seed-bed into the Nurſery. Nurſerymen in the Northern Counties do not allow much more than half the diſtance here recommended, and probably the greater coldneſs of their climate may make it neceſſary to croud the plants cloſer together. Some other differences may be remarked which, in like manner, may be accounted for from the variation of climate.

Having thus given ſome particular directions for forming the Seminary, and afterwards ſtocking it with plants, it will be required to ſay ſomething concerning the Nurſery into which the infant ſeedlings muſt be removed at proper ſeaſons, in order to train them for planting out; and in fixing upon a proper piece of ground for this purpoſe, I do recommend it to be a rich, deep, and ſtiffiſh mould, notwithſtanding that the trees muſt afterwards be removed into a poorer ſoil. Reaſon teaches that young trees, growing luxurioufly and freely in a good ſoil, will form vigorous and healthy roots, whereby they will be qualified to nouriſh themſelves well; and when they come to be afterwards planted into worſe land they will be enabled, from the ſtrength of their conſtitution, to feed themſelves freely with coarſer food. On the contrary, young trees, raiſed upon poor land, by having their veſſels contracted, and their outward bark moſſy and diſeaſed, will be a long time, even after being removed to a rich ſoil, before they attain to a vigorous and growing ſtate: and as this is ſuggeſted by reaſon, experience confirms it to be true.—Having fixed upon a proper place, therefore, large enough to contain the quantity of trees wanted; in the firſt place let it be well fenced, either with hedges ſufficient to keep out cattle, or pales or walls to keep out rabbits or hares; for without ſuch defence a nurſery will be ſoon demoliſhed. Then trench the land all over, turning the turf down to the bottom of the trench, and covering it with the other mould; and in doing of this, be ſure not to dig deeper than the natural ſoil; for if you go ever ſo little below it, that lying at the top will be ready to ſurround the roots of the different trees and plants as they are brought from the ſeminary, and will retard their ſtriking root at firſt, if not totally kill them.—— When the whole is thus trenched, or double dug, which muſt be in September, the ſurface ſhould be ſmoothed, and laid out in quarters for the reception of the different trees taken from the Seminary.

againſt both which, ſuch as are planted in copſes, and in ample woods, are ſufficiently defended by the mounds and their cloſer order, eſpecially if they riſe of ſeed: but where they are expoſed in ſingle rows, as in walks and avenues, the moſt effectual courſe is to empale them with three good quarter ſtakes of competent length, ſet in triangle, and made faſt to one another by ſhort pieces above and beneath, in which a few brambles being ſtuck, they will be abundantly ſecured, without that choaking or fretting, to which trees are obnoxious that are only ſingle ſtaked and buſhed, as the vulgar manner is; nor is the charge of this ſo conſiderable as the great advantage, if we conſider the frequent reparations which the other will require. Where cattle do not come, I find a good piece of rope tied faſt about the neck of trees upon a wiſp of ſtraw to preſerve it from galling, and the other end tightly ſtreined to a hook or a peg in the ground (as the ſhrouds in a ſhip are faſtened to the maſts) ſufficiently ſtabliſhes my trees againſt the weſtern blaſts without more trouble, for the winds of other quarters ſeldom infeſt us: But theſe cords had need be well pitched to preſerve them from wet, and ſo they will laſt many years. I cannot in the mean time conceal what a noble perſon has aſſured me, that in his goodly plantations of trees in Scotland, where they are continually expoſed to much greater and more impetuous winds than we are uſually acquainted with, he never ſtakes any of his trees, but upon all diſaſters of this kind, cauſes only his ſervants to re-dreſs and ſet them up again as often as they happen to be overthrown, which he has affirmed to me, thrive better than thoſe which he has ſtaked; and that at laſt they ſtrike root ſo faſt, as nothing but the ax is able to proſtrate them: And there is good reaſon for this, in my opinion; for theſe concuſſions open the mould for the more ready inſinuations of the roots in queſt of nouriſhment. It is in another place I ſuggeſt, that tranſplanted Pines and Firs, for want of their penetrating tap-roots, are hardly conſiſtent againſt theſe guſts after they are grown high, eſpecially where they are ſet cloſe, and in tufts, which betrays them to the greater diſadvantage; and therefore ſuch trees do beſt in walks, and at competent diſtances, where they eſcape tolerably well. Such therefore as we deſign for woods of them, ſhould be ſowed and never removed. In the mean time, many trees are alſo propagated by cuttings and layers; the Ever-greens about Bartholomew-tide; other trees within two or three months after, when they will have all the ſap to aſſiſt them. Every body knows the way to do it is by ſlitting the branch a little way, and then to plunge it half a foot under good mould, leaving

BOOK I. as much of its extremity above it; and if it comply not well, to peg it down with an hook or two, and ſo when you find it competently rooted, to cut it off beneath, and plant it forth *. Other expedients there are, by twiſting the part, or baring it of the rind; and if it be out of reach of the ground, to faſten a tub or baſket of earth near the branch, filled with a ſucculent mould, and kept as freſh as may be. For cuttings, about the ſame ſeaſon, take ſuch as are about the bigneſs of your thumb, ſetting them a foot in the earth, and near as much

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* There are various ways of layering trees, by which they may be multiplied. In order to raiſe great quantities, a ſufficient number of trees ſhould be ſet, to be headed down for ſtools. The ground, previous to planting, ſhould be double dug; and the diſtances they ought to be ſet from each other ſhould vary according to the ſize, height, or manner they are intended to grow before they are layered. The autumn after planting, each tree ſhould be headed to within a few inches of the ground; and the ſummer following it will afford you plenty of young ſhoots proper for layering in the autumn.—Nevertheleſs, in many trees, it will be the beſt way to wait two years before you layer them, as each ſtool will afford you ten times the number of layers for the purpoſe; and the ſhoots being then many of them ſide-ſhoots, and weaker than the ſtrong ſhoots from the ſtool the autumn before, will, for the moſt part, more readily ſtrike root: For it is obſervable, that, in vigorous ſtrong ſhoots, though only of one year's growth, after they have been layered a twelvemonth, even by ſlit-layering, the end of the divided part has only ſwelled, and ſtruck no root; whereas ſmaller branches on the ſame tree, in the ſame ſpace of time, have ſtruck good root, and commenced plants fit to be taken off and removed to the nurſery.—If the tree has grown from the ſtool two years, it muſt be ſplaſhed, to bring the head and branches down to the ground: All branches which croſs, croud, or any ways incommode each other, muſt be taken out, the ground ſhould be excavated, and the head of each branch brought into the hollow, pegging it down firmly with a ſtrong peg. The ends of the young ſhoots muſt be alſo ſhortened; for one eye only, for the moſt part, ought to be out of the ground, if you can tell how they will fall, as it will be a ſafer way to do it before the ſlit is made than afterwards. Then the ſlit, or twiſt, or whatever method you chooſe, muſt be entered upon; and when all the branches have undergone the operation, the mould muſt be carefully brought in among them, filling all the interſtices, and levelling the whole ſo that an eye of each may juſt appear above ground; and if any ſhoot was before improperly ſhortened, it may now be done, holding it ſteady with the left thumb and finger, and cutting off an eye above the ground with the right. When the ſtool is completely layered in this manner, proceed to the next; and ſo on till the whole is completed.—By waiting two years after the heading of the plant for the ſtools, ſtools which perhaps would hardly have afforded you ſix plants will now yield ſixty, or more, which is a ſufficient encouragement for patience; nay, it is what ought to be practiſed by nurſery-men, or gentlemen who want to raiſe large

out. If it be of ſoft wood, as Willow, Poplar, Alder, &c. you may take much larger truncheons, and ſo tall as cattle may not reach them; if harder, thoſe which are young, ſmall, and more tender; and if ſuch as produce a knur, or burry ſwelling, ſet that part into the ground, and be ſure to make the hole ſo wide, and point the end of your cutting ſo ſmooth, as that, in ſetting, it violate and ſtrip none of the bark; the other extreme may be ſlanted, and ſo treading the earth cloſe, and keeping it moiſt, you will ſeldom fail of ſucceſs. By the roots alſo of a thriving, luſty, and

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quantities of trees for ſale, or to be planted out on their own eſtates.——And when this is the caſe, two quarters of ſufficient ſize ſhould be planted for ſtools, which coming in alternately, one with another, there may be an annual crop of layers for the purpoſes wanted.——As ſoon as the layers are taken off, all ſcraggy parts ſhould be cut off from the ſtools; the heads ſhould be refreſhed with the knife; and two years after, each ſtool will afford you a ſufficient quantity of branches to be layered afreſh; during which time the ground ſhould be dug between the ſtools every winter; and in ſpring and ſummer the weeds ſhould be hoed and cleared off, as often as they make their appearance.——Trees of much larger growth than two or three years may be ſplaſhed, brought down, and layered in this manner; and when they are grown too large for ſplaſhing, or the nature of the wood will not bear ſuch an operation, they may be thrown on their ſides. In order to effect this, the mould muſt be cleared away from the roots, on the ſide you intend the head to be brought down; and on this ſide a ſufficient number of the roots muſt be cut, that the tree may be brought to the ground, leaving proper roots to continue it in a growing ſtate; but for this very few will be ſufficient. When the tree is brought down, all the young branches are to be layered in the former manner; and the year following, after they are taken off, the tree may be ſet upright again, cutting off all ſcraggy parts, ſide-branches that had been beat down, &c. and if you put freſh mould to the roots, it will put out as freſh as ever, and may, if you pleaſe, afterwards undergo a ſecond operation in the like manner. If Magnolias, or large leafy Ever-greens, are layered in this manner, and the place is not well defended, it will be highly proper to make a ſtake-hedge of good height, at a ſmall diſtance; otherwiſe the high winds having power on their large leaves, will frequently break them off before they have taken root.——Layers may be procured from trees of any ſize, by building ſcaffolding of proper height, to ſupport tubs or pots filled with good earth, in which to layer the young branches: But this method is never practiſed unleſs on ſome very ſcarce tree, which is deſired to be continued in its upright ſtate, in as much beauty as poſſible. Neither, indeed, does it deſerve to be adopted, unleſs on ſome ſuch extraordinary occaſions, not only on account of the expence of building the ſcaffolding, but of the conſtant trouble there will be in keeping the mould in the pots of a due moiſture; for being elevated in that manner above the ground, it will dry very faſt; and if it is not conſtantly watered, there will be little hope of your layers ſtriking root in any reaſonable time—Layering

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ſappy tree, more may be propagated; to effect which, early in the ſpring, dig about its foot, and finding ſuch roots as you may with a little cutting bend upwards, raiſe them above ground three or four inches, and they will in a ſhort time make ſhoots, and be fit for tranſplantation; or in this work you may quite ſeparate them from the mother-roots, and cut them off; by baring likewiſe the bigger roots diſcreetly, and hacking them a little, and then covering them with freſh mould, *matres* and mother-roots, *nepotes* ſuccours, *traduces* and rooted ſets, may be raiſed in abundance;

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may be performed different ways; and trees of different texture are with different degrees of difficulty made to ſtrike root. It is chiefly the young ſhoots of the preceding ſummer that the operation ſhould be performed on; though all wood of a looſe texture or ſpungy nature, if ſeveral years old, will grow very well.——The different ways of layering are: 1. By only making a ſmall cavity and laying the ſhoot, whether young or old, in it, covering it over with fine mould. No other trouble than this ſlight layering is neceſſary for the increaſe of numbers of trees; ſuch as Vines, Viburnums, Laurels, &c.—2. By twiſting the ſhoots and ſlightly breaking the bark, numerous trees, which would not ſo readily take by the former method, will emit roots from the bruiſed parts; and, if the work be performed in the autumn, will commence good plants by the autumn following.——3. By thruſting an awl through the joint, the young ſhoots of many trees will ſooner emit fibres from ſuch wounded part, than if they had been otherwiſe laid in the ground; and in the courſe of the ſummer months will commence good plants, fit to be taken off and planted out.——4. Cutting out ſome ſmall ſlips of bark, about a joint, will facilitate the ſhoot's ſtriking root, and cauſe it the ſooner to commence a plant.—5. Twiſting of wire round the ſhoot, and pricking it in each ſide with an awl, has been recommended: I ever found the twiſting unneceſſary trouble, if the places were pricked with the awl, as the fibres always proceeded from the wounded places, and not from the parts ſurrounded by the wire; nevertheleſs, it may be ſerviceable in ſome caſes, if the binding is not too hard, and the bark bruiſed or broken only with the wire: from ſuch bruiſed parts fibres will come out, and then the pricking with the awl may be omitted.——6. Slit-layering, or that operation generally known among gardeners by the name of Tongue-layering, is the moſt univerſal, the beſt, and the ſafeſt way of layering trees and plants, and is the only method to have recourſe to when the former fail. It is known to every floriſt, who layers his carnations this way; and is practiſed by all gardeners for almoſt all ſorts of trees which are not known to take by the ſimple method of barely laying the ſhoots in the ground.——Tongue-layering is performed by cutting with the knife half way through the ſhoot at right angles with it, and then turning the edge of it upwards, in a perpendicular direction, along the middle of the ſhoot, half an inch, an inch, or more, according to the nature of the ſtock that is to be layered. The horizontal cut in carnation-layering is always at a joint, and is for the moſt part practiſed by making the cut at a joint or end, where the performance is on trees. The more elegantly to

which drawing competent roots, will ſoon furniſh ſtore of plants, and this is practicable in Elms eſpecially, and all ſuch trees as are apt of themſelves to put forth ſuckers; but of this more upon occaſion hereafter. And now to prevent cenſure on this tedious and prolix introduction, I cannot but look on it as the baſis and foundation of all the ſtructure riſing from this work and endeavour of mine; ſince from ſtation, ſowing, and continual culture and care, proceed all we really enjoy in the world. Every thing muſt have birth and beginning; and afterwards, by diligence and prudent care, formed and brought to ſhape and perfection. Nor is it

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perform this, make the horizontal cut half through; take out the knife and inſert it below that cut, on the heel of the underwood, taking it off, and drawing the edge of the knife up the middle to the above length. By taking the heel of the underwood off, the tongue or bottom of the layer will ſit more at eaſe; and by being ſurrounded with mould, will be the better diſpoſed to ſtrike root, ſhould the parts by any accident be made to cloſe again. The ſhoot being cut in this manner, ſhould be next pegged down into the ground, a place being hollowed for the purpoſe; then the point of the layer ſhould be brought forward, pointing towards the ſtem of the plant, which will ſeparate the tongue from the other part of the branch; and to keep it at a diſtance, a ſmall chip, or ſuch like thing, may be inſerted near the top of the ſlit, to keep it open. The mould muſt now be applied; and after heading the layer down to within one eye or more of the ground, the buſineſs is done.—In all layering, watering muſt be applied in ſummer to keep the ground moiſt, if dry weather ſhould happen. The ground muſt always be kept clean from weeds; and there are few trees, if layered in this manner in the autumn, and with this management, which will not be ready for taking up the autumn following.——Layering on different plants may be performed at all times of the year; though, in general, the beſt ſeaſon for it is in the autumn: Nevertheleſs, it may be done ſucceſsfully for the moſt part in the winter or ſpring; and ſuch plants as are found not to take readily by being layered at that ſeaſon, ſhould be layered in June or July, while they are tender, and performing their ſummer's ſhoot; but as the ſhoots will then be ſoft and herbaceous, they muſt not be too much watered, for that will cauſe them to rot; therefore it will be a better method to cover the ſurface over the layers with moſs, which will prevent the ſoil from drying too faſt, ſo that a little water, now and then, will be ſufficient.——A large ſhare of the vegetable creation may be alſo multiplied by planting only their ſlips or cuttings in the earth, and affording them management ſuitable to their reſpective natures. Some trees grow ſo readily this way, that it is the only method practiſed to raiſe any deſired number of plants: The Willow, the Alder, the Poplar, &c. in all their varieties, are inſtances of the larger kinds; whilſt the Sage, the Roſemary, the Rue-plant, and Southernwood, are ſome inſtances of the lower ligneous plants, that are, with the utmoſt facility, multiplied by ſlips. Theſe will grow if planted at any time of the year; but ſuch as will not prove ſo obſequious to your diſcipline, you muſt indulge in the ſeaſon they

Book I. enough to caſt ſeeds into the ground, and leave them there, as the Oſtrich * does her eggs in the Lybian ſands, without minding them more (becauſe nature has deprived her of underſtanding); but great diligence is to be uſed in governing them, not only till they ſpring up, but till they are arrived to ſome ſtature fit for tranſplantation, and to be ſent abroad, after the ſame method that our children ſhould be educated, and taken care of from their birth and cradle; and afterwards, whilſt they are under pedagogues and diſcipline, for the forming of their manners and perſons, that they contract no ill habits, and take ſuch plyes as are ſo difficult to rectify and ſmooth again without the greateſt induſtry: For prevention of this in our ſeminary, the like care is requiſite: whilſt the young imps and ſeedlings are yet tender and flexible, they require not only different nouriſhment and

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require to be ſet in; the autumn for ſome, the ſpring for others; the early part of the ſummer for one plant, and the latter end of it for another; all which various circumſtances will be particularly deſcribed under the article of the reſpective trees.

* It is commonly reported that the female Oſtrich depoſits her eggs in the ſand, and covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to ſhift for themſelves. Very little, however, of this hiſtory is true; no bird has a ſtronger affection for her young than the Oſtrich, and none watches her eggs with greater aſſiduity. It happens, indeed, in thoſe climates, that there is leſs neceſſity for the continual incubation of the female; and ſhe more frequently leaves her eggs, as they are in no danger of being chilled by the weather; but though ſhe ſometimes forſakes them in the day, ſhe always carefully broods over them in the night: and Kolben, who has ſeen great numbers of them at the Cape of Good Hope, affirms, that they ſit upon their eggs like other birds, and that the male and female take this office by turns, as he had frequent opportunities of obſerving. Nor is it more true what is ſaid of their forſaking their young after they are excluded the ſhell: On the contrary, the young ones are not able to walk for ſeveral days after they are hatched. During this time, the old ones are very aſſiduous in ſupplying them with graſs, and very careful to defend them from danger; nay, they encounter every danger in their defence. When purſued, this animal, inſtead of running directly forwards, and availing himſelf of his natural ſpeed, takes his courſe in circles; while the hunters make a ſmall courſe within, relieve each other, meet him at unexpected turns, and keep him thus employed for two or three days together: At laſt, ſpent with famine and fatigue, and finding all power of eſcape impoſſible, he endeavours to hide himſelf from thoſe enemies he could not avoid, and covers his head in the ſand, or the firſt thicket he meets. The means uſed by this bird to eſcape from its purſuers, and the manner of its death, may, with great propriety, be called *fooliſhneſs*.—Writers have hitherto been miſtaken in the Natural Hiſtory of the Oſtrich.——See Job, ch. xxxix. with which compare Goldſmith on Animated Nature, vol. v. p. 49.

protection from too much cold, heat, and other injuries, but due and ſkilful management in dreſſing, redreſſing, and pruning, as they grow capable of being brought into ſhape, and of hopeful expectation, when time has rendered them fit for the uſe and ſervice required, according to their kinds. He therefore that undertakes the nurſery, ſhould be knowing not only in the choice of the ſeeds, where, when, and how to ſow them, but alſo in the time of geſtation they require in the womb of their mother-earth before parturition, that ſo he may not be ſurprized with her delivering ſome of them ſooner or later than he expects; for ſome will lie two, nay three years, before they peep; moſt others one, and ſome a quarter, or a month or two, whilſt the tardy and leſs-forward ſo tire the hopes of the huſbandman, that he many times digs up the plats and beds in which they were ſown, deſpairing of a crop, at the very time they were ready to ſpring and come up, as I have found by experience to my loſs. Thoſe of hard ſhell and integument will lie longer buried than others; for ſo the Libanus Cedar, and moſt of the coniferous trees, ſhed their cones late, which ſometimes remain two winters and as many ſummers, to open their ſcales glued ſo faſt together, without ſome external application of fire or warm water, which is yet not ſo natural as when they open of themſelves *. The ſame may be obſerved of ſome minuter ſeeds, even among the Olitories, as that of Parſley, which will hardly ſpring in leſs than a year, ſo Beet-ſeed, part in the ſecond and third month, which, upon inſpecting the ſkins and membranes involving them, would be hard to give a reaſon for †. To accelerate this, they uſe imbibitions of piercing ſpirits, ſalts, emollients, &c. not only to the ſeeds, but to the ſoil, which we ſeldom find ſignify much, but rather produce abortion or monſters; and being forced to haſty birth, become nothing ſo hardy, healthful, and laſting as the conception and birth the plants receive from nature. Theſe obſervations premiſed, I ſhould now proceed to particulars, and boldly advance into the thickeſt

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* The cones of the Fir tribe ſhould be laid in the ſun early in the ſpring, which will open their ſcales and permit the ſeeds to be ſhook out: The practice of opening the cones, by laying them upon the floor of a malt-kiln, is highly to be condemned. This expeditious method is often practiſed by ſeedſmen——which rationally accounts for the badneſs of the Fir-ſeed ſometimes purchaſed from wholeſale dealers.

† In this particular, Mr. Evelyn ſeems to have been miſinformed. Parſley-ſeed remains in the earth about four weeks, and the ſeed of the Beet generally appears in about ten days after ſowing.

Book I.

of the foreſt, did not method ſeem to require ſomething briefly to be ſpoken of trees in general, as they are under the name of Plants and Vegetables, eſpecially ſuch as we ſhall have occaſion to diſcourſe of in the following work; though we alſo take in ſome leſs vulgarly known and familiar, of late indenizoned among us, and ſome of them very uſeful.

By trees then is meant a lignous plant, whoſe property is, for the moſt part, to grow up and erect itſelf with a ſingle ſtem or trunk, of a thick compacted ſubſtance and bulk, branching forth large and ſpreading boughs, the whole body and external part covered and inveſted with a thick rind or cortex. Theſe Terræ-filii are what we call Timber-trees, the chief ſubject of our following diſcourſe.

Trees are diſtinguiſhed into ſubordinate ſpecies. Frutices, or ſhrubs, are lignous trees, though of a lower and humbler growth, leſs ſpreading, and riſing up in ſeveral ſtems, emerging from the ſame root, yielding plenty of ſuckers, which being ſeparated, and often carrying with them ſome ſmall fibre, are eaſily propagated and planted out for a numerous ſtore; and this being clad with a more tender bark or fibre, ſeems to differ the frutex from other arboreous kinds; ſince as to the ſhaft and ſtems of ſuch as we account dwarf and pumilo, they riſe often to tall and ſtately trees, in the more genial and benign climes. *

Suffrutices are ſhrubs lower than the former, ligneſcent and more approaching to the ſtalky herbs, Lavender, Rue, &c. but not apt to decay ſo ſoon, after they have ſeeded; whilſt both theſe kinds ſeem alſo little more to differ from one another, than do trees from them; all of them conſiſting of the ſame variety of parts, according to their kinds and ſtructure, covered with ſome woody hard membranous or tender rind, ſuitable to their conſtitution, and to protect them from outward injuries; producing likewiſe buds, leaves, bloſſoms, and flowers, pregnant with fruit, and yielding ſaps, liquors, and juices, lachrymæ, gums, and other exſudations, though diverſifying in ſhape and ſubſtance, taſte, odour, and other qualities and operations, according to the nature of the ſpecies. To compare analogically, and deſcribe minutely the various ſtructure and contexture of their ſeveral veſſels and organs, whoſe office it is to ſupply

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* For the opinion of different authors concerning the foundation of the diſtinction of vegetables into herbs, trees, ſhrubs, and under-ſhrubs, ſee the note upon p. 3.

the whole plant with all that is neceſſary to its being and perfection, after a ſtupendous, though natural proceſs, (not altogether different from creatures of animal life) would require an anatomical lecture, which is ſo learnedly and accurately done to our hands by Dr. Grew, Malpighius, and other ingenious naturaliſts. *

Beſides this general definition, as to what is meant by trees, frutexes, &c. they are ſpecially diſtinguiſhed by other characters, viz. *Leaves*, *Buds*, *Bloſſoms*, &c. but more eſpecially by what they produce of more importance;——by their fruit ye ſhall know them. V. G.

The Glandiferæ, Oaks, and Ilexes, yield acorns and other uſeful excreſcences.—The Maſt-bearers are the Beech, and ſuch as include their ſeeds

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* Mr. Evelyn very juſtly obſerves, that there is a great analogy between the animal and vegetable creation; and this is apparently diſcovered in the ſimilar manner that plants and animals propagate their reſpective ſpecies. It is allowed on all hands that animal conception is performed by the junction of the male and female; but it has remained a doubt with ſome, whether the union of the ſexes be as eſſential in the propagation of vegetables. The great Linnæus has formed his noble ſyſtem of botany upon the certainty that all plants have male and female organs, either growing upon the ſame tree, or upon different trees of the ſame ſpecies: His method is diſtinguiſhed by the name of the Sexual Syſtem, and is now univerſally acknowledged. On its firſt appearance, it was received with all that caution that becomes an enlightened age; and nature was traced experimentally through all her variations before it was univerſally aſſented to. Tournefort refuſed to give it a place in his Syſtem; and Pontedera, though he had carefully examined it, treated it as chimerical. The learned Dr. Alſton, Profeſſor of Botany in the Univerſity of Edinburgh, violently oppoſed it; but the proofs which Dr. Linnæus has given amongſt the aphoriſms of his Fundamenta Botanica, and farther illuſtrated and explained in his Philoſophia Botanica, are ſo clear, that the mind does not heſitate a moment in pronouncing animal and vegetable conception to be the ſame: There is, however, this difference; in animals fruition is voluntary, but in vegetables neceſſary and mechanical. Another and more ſtriking proof of the analogy between plants and animals may be drawn from obſervations made upon their infant ſtates, at which early period they ſeem nouriſhed and protected in a ſimilar manner. For this the curious reader is requeſted to conſult the note upon page 27, in which he will find ſufficient proofs to convince him, that every blade of graſs which we contemptuouſly tread upon, has been nurtured in its infancy by the hand of Providence, with as much care, and in the ſame manner, as Man himſelf with all his pre-eminence of ſtation.

Book I. and fruit in rougher huſks, as the Cheſnut-tree, &c.—The Walnut, Haſel, Avelans, &c. are the Nuciferæ.—To the Coniferæ, Reſiniferæ, and Squammiferæ, belong the whole tribe of Cedars, Firs, Pines, &c.——Apples, Pears, Quinces, and ſeveral other Edulæ fruits, Peaches, Apricots, Plums, &c. are reduced to the Pomiferæ.—The Bacciferæ are ſuch as produce Kernels, Sorbs, Cherries; viz. Holley, Bay, Laurel, Yew, Juniper, Elder, and all the berry-bearers.—The Geniſtæ in general, and ſuch as bear their ſeeds in cods, come under the tribe of Siliquoſæ.—The Lanuginæ are ſuch as bed their ſeeds in a cottony down.

The Aſh, Elm, Tilia, Poplar, Hornbeam, Willow, Salices, &c. are diſtinguiſhed by their Keys, Tongues, Samera, Pericarpia, and Theca, ſmall, flat, and huſky ſkins including the ſeeds as in ſo many foliols, bags, and purſes, fine membranous caſes, Catkins, Palms, Juluſes, &c. needleſs to be farther mentioned here, being ſo particularly deſcribed in the chapters following, as are alſo the various Ever-greens and Exoticks.

Pl 69.



The Oak & Tree

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CHAP. III.

The OAK. *

1. ROBUR, the Oak. I have ſometimes conſidered it very ſeriouſly, what ſhould move Pliny to make a whole chapter of one only line, which is leſs than the argument alone of moſt of the reſt in his huge volume; but the weightineſs of the matter does worthily excuſe him, who is not wont to ſpare his words or his reader. *Glandiferi maximè generis omnes quibus honos apud Romanos perpetuus.* "Maſt-bearing trees were principally "thoſe which the Romans held in chiefeſt repute." Lib. xvi. cap. iii.—And in the following, where he treats of Chaplets, and the dignity of the Civic Coronet, he ſays it might be compoſed of the leaves or branches of any Oak, provided it were a bearing tree, and had acorns upon it. It is then for the eſteem which theſe wiſe and glorious people had of this tree above all others, that I will firſt begin with the Oak; and indeed it carries it from all other timber whatſoever, for building of ſhips in general, and in particular being tough, bending well, ſtrong and not too heavy, nor eaſily admitting water. CHAP. III.

2. 'Tis pity that the ſeveral kinds of Oak are ſo rarely known amongſt us, that wherever they meet with Quercus, they take it promiſcuouſly for our common Oak; as likewiſe they do Δρῦς, which comprehends all

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* The Oak, the pride and glory of the foreſt, demands our firſt attention, whether we conſider the dignity of its ſtation, or the variety of uſes to which it is applied. Being a native of our iſland, it adapts itſelf in a wonderful manner to almoſt every ſoil, and, if well defended in its infancy, there are few places in which it will not grow to a national advantage. The Oak naturally delights in a rich, deep, and loamy ſoil; but lands of that quality are now more profitably employed in paſture and tillage. However, there are large portions of land in this kingdom which yield but a ſmall profit to the owners. Such waſtes, if ſituated near rivers, or navigable canals, are nobly calculated for raiſing Oaks, which, at ſome diſtant period, may launch themſelves into the Ocean, Guardians of Liberty and Commerce. Of the Oak there are various ſpecies, and Mr. Miller, in the laſt edition of his Dictionary, has deſcribed no leſs than ſeventeen kinds.

1. QUERCUS *(Robur)* foliis deciduis oblongis ſupernè latioribus, ſinubus acutioribus, angulis obtuſis, petiolatis, glandibus ſeſſilibus. *Oak with oblong deciduous leaves, broader toward the top, having acute indentures, with obtuſe angles, which have long*

BOOK I. Maſt-bearing trees whatſoever (which I think they have no Latin word for.) And in the Silva Glandifera were reckoned the Cheſnut——Ilex, Eſculus, Cerris, Suber, &c. being various ſpecies rather than different trees. We ſhall here, therefore, give an account of four only, two of which are moſt frequent with us; for we ſhall ſay little of the Cerris or

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foot-ſtalks, and acorns ſitting cloſe to the branches. Quercus latifolia mas, quæ brevi pediculo eſt. C. B. P. 419. *Broad-leaved male Oak, the fruit of which has ſhort foot-ſtalks, or common Oak.*

This is the common Engliſh Oak which, for ſhip-building and other œconomical uſes, far excels all the kinds in the known world. The leaves of this ſort have pretty long foot-ſtalks; the acorns have none, but ſit cloſe to the branches.

2. QUERCUS *(Fœmina)* foliis deciduis oblongis obtuſis, pinnato-ſinuatis petiolis breviſſimis, pedunculis glandorum longiſſimis. *Oak with oblong, obtuſe, deciduous leaves, which are winged, ſinuated, and have very ſhort foot-ſtalks, with a fruit growing upon long foot-ſtalks.* Quercus cum longo pediculo. C. B. P. 429. *Oak with long foot-ſtalks to the acorn.*

This ſort is not ſo common here as the firſt, but in the wilds of Kent and Suſſex are ſeen many large trees of this kind. The leaves of this are not ſo deeply ſinuated as thoſe of the firſt, nor are they ſo irregular, but the indentures are oppoſite, like the lobes of winged leaves; theſe have ſcarce any foot-ſtalks, but ſit cloſe to the branches; the acorns ſtand upon very long foot-ſtalks, in which they differ from the common ſort. The timber of this ſort is accounted, by ſome, better than that of the firſt, and the trees when growing have a better appearance. Theſe have been generally ſuppoſed to be ſeminal varieties, which have accidentally come from acorns of the ſame trees; I was long of this opinion, but having lately ſeen ſome young trees with acorns upon them, which were raiſed from acorns of the ſecond ſort, and finding they retain their difference, I am now inclined to believe they are different.

3. QUERCUS *(Sempervirens)* foliis oblongis ſinuatis obtuſis perennantibus, pedunculis glandorum longiſſimis. *Oak with oblong, obtuſe, indented leaves which are evergreen, having very long foot-ſtalks to the acorns.* Quercus latifolia perpetuò virens. C. B. P. 420. *Broad-leaved evergreen Oak.*

This ſort grows upon the Appennines, and alſo in Swabia and Portugal. The leaves are broader, and not ſo deeply ſinuated as thoſe of the common Oak; they are of a lighter green on their upper ſide, and pale on their under; they have very ſhort foot-ſtalks, and their points are obtuſe; the acorns have very long foot-ſtalks, which frequently ſuſtain three or four growing in a cluſter.

4. QUERCUS *(Humilis)* foliis oblongis obtusè dentatis, fructibus ſeſſilibus conglomeratis. *Dwarf Oak with oblong obtuſely indented leaves, and fruit growing in cluſters*

Ægilops, goodly to look on, but for little elſe: Some have miſtaken it for Beech, whereas indeed it is a kind of Oak bearing a ſmall round acorn almoſt covered with the cup, which is very rugged, the branches loaded with a long moſs hanging down like diſhevelled hair, which much annoys it. Φάγος is indeed doubtleſs a ſpecies of Oak; however by the Latins uſual-

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ſitting cloſe to the branches. Quercus humilis gallis binis ternis aut plurimis ſimul junctis. C. B. P. 420. *Dwarf Oak with galls growing together by pairs, by threes, or in larger cluſters.*

This kind grows in the ſouth of France and Italy; it is a low buſhy Oak, which riſes but ſix or ſeven feet high, ſending out many ſlender branches the whole length, garniſhed with oblong leaves which are obtuſely indented; they are about three inches long, and one and a half broad, ſtanding upon ſlender foot-ſtalks; the acorns are ſmall and grow in cluſters, and the galls grow three or four together.

5. QUERCUS *(Cerris)* foliis oblongis lyrato-pinnatifidis, laciniis tranſverſis acutis, ſubtus ſubtomentoſis. Lin. Sp. Plant. 1415. *Oak with oblong leaves which are lyre-ſhaped, wing-pointed, and have tranſverſe acute jags which are downy on their underſide.* Quercus calyce hiſpido, glande minore. C. B. P. 420. *Oak with prickly cups and ſmaller acorns.*

This grows in Burgundy; the leaves are oblong and pointed, and frequently indented in the middle like a lyre; they are jagged and acute-pointed, a little hoary on their under ſide, ſtanding upon ſlender foot-ſtalks. The acorns are ſmall, and have rough prickly cups.

6. QUERCUS *(Eſculus)* foliis pinnato-ſinuatis lævibus, fructibus ſeſſilibus. Prod. Leyd. 80. *Oak with ſmooth wing-indented leaves, and fruit ſitting cloſe to the branches.* Quercus parva ſive Phagus Græcorum & Eſculus Plinii. C. B. P. *The ſmall Oak or Phagus of the Greeks, and the Eſculus of Pliny, commonly called the cut-leaved Italian Oak.*

This ſort grows naturally in Spain and Italy; the leaves are ſmooth, and deeply ſinuated like winged leaves; ſome of the ſinuſes are obtuſe, and others end in acute points; they have very ſhort foot-ſtalks; the branches are covered with a purpliſh bark when young; the acorns are long and ſlender, the cups rough and a little prickly, ſitting cloſe to the branches. The acorns are ſweet, and are frequently eaten by the poor in the ſouth of France, who, in times of ſcarcity, grind them and make bread with the flour.

7. QUERCUS *(Ægilops)* foliis ovato-oblongis, glabris, ſerrato-dentatis. Lin. Sp. Plant. 1414. *Oak with oblong, oval, ſmooth, ſawed, indented leaves.* Quercus calyce echinato, glande majore. C. B. P. 420. *Oak with a prickly cup and a larger acorn.*

This grows naturally in the Levant, from whence the acorns are annually brought to Europe, where they are uſed for dyeing; theſe are called Velani, and the tree

Book I. ly applied to the Beech, whoſe leaf exceedingly differs from that of the Oak, as alſo the maſt and bark rugged, and growing among the hills and mountains; the other in the valleys, and perhaps but few of them in Italy. Phyſicians, Naturaliſts, and Botaniſts ſhould therefore be curious how they deſcribe and place ſuch trees, mentioned by Theophraſtus and others,

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Velanida by the Greeks. It is one of the faireſt ſpecies of Oak in the world: the trunk riſes as high as the common Oak; the branches extend very wide on every ſide, and are covered with a greyiſh bark, intermixed with brown ſpots; the branches are cloſely garniſhed with oblong oval leaves, about three inches long, and almoſt two broad, which are deeply ſawed on their edges; moſt of the ſaws or teeth turn backward, and terminate in acute points. The leaves are ſtiff, of a pale green on their upper ſide, and downy on their under; the acorns have very large ſcaly cups which almoſt cover them; the ſcales are ligneous and acute-pointed, ſtanding out a quarter of an inch; ſome of the cups are as large as middling apples.

8. QUERCUS *(Rubra)* foliis obtusè-ſinuatis ſetaceo-mucronatis. Lin. Sp. Plant. 1413. *Oak with obtuſe ſinuated leaves, terminated by briſtly points* Quercus Eſculi diviſurâ, foliis amplioribus aculeatis. Pluk. Alm. 309. tab. 54. fig. 4. *Oak with broad ſpiny leaves, which are divided like the Eſculus.*

This ſort grows naturally in Virginia, and in other parts of North-America. It arrives to a large ſize in the countries where it naturally grows; the bark is ſmooth, of a greyiſh colour, but that of the younger branches is darker; the leaves are ſix inches long, and two and a half broad in the middle, where they are broadeſt; they are obtuſely ſinuated, each ſinus ending with a briſtly point, of a bright green, ſtanding upon ſhort foot-ſtalks. The leaves continue their verdure very late in autumn, ſo that unleſs hard froſt comes on early, they do not fall till near Chriſtmas, and they do not change their colour long before. The acorns of this ſort are a little longer, but not ſo thick as thoſe of the common Oak.

9. QUERCUS *(Prinus)* foliis obovatis utrinque acuminatis ſinuato-ſerratis, denticulis rotundatis uniformibus. Hort. Cliff. 448. *Oak with oblong oval leaves which are pointed on both ſides, and have ſawed ſinuſes, with uniform roundiſh indentures.* Quercus, caſtaneæ foliis, procera arbor, Virginiana. Pluk. Alm. 309. *The American Cheſnut-leaved Oak.*

This grows naturally in North-America, of which there ſeems to be two kinds; one grows to a much larger ſize than the other, tho' this may be occaſioned by the ſoil in which they grow; the largeſt ſort grows in the rich low lands, where it becomes the largeſt tree of any of the Oaks in thoſe countries. The wood is not of a fine grain, but is very ſerviceable; the bark is grey and ſcaly; the leaves are

under the ſame denomination as frequently they do, being found ſo very different when accurately examined. There is likewiſe the Eſculus, which, though Vitruvius, Pliny, Dalecampius, and others take for a ſmaller kind, Virgil celebrates for its ſpreading and profound root; and this Dalecampius will therefore have to be the Platyphyllos of Theophraſtus, and, as our

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five or ſix inches long, and two inches and a half broad in the middle, indented on the edges, and have many tranſverſe veins running from the midrib to the borders; they are of a bright green, and ſo nearly reſemble thoſe of the Cheſnut-tree, as ſcarcely to be diſtinguiſhed from it. The acorns of this ſort are very large, and their cups are ſhort. The leaves of the other variety are not ſo large, nor ſo ſtrongly veined, and the acorns are ſmaller and a little longer, which may ariſe from the ſoil.

10. QUERCUS *(Nigra)* foliis cuneiformibus obſoletè trilobis. Flor. Virg. 117. *Oak with wedge-ſhaped leaves, having three worn-out lobes.* Quercus folio non ſerrato in ſummitate quaſi triangulo. Cateſb. Car. 1. p. 20. *The Black Oak.*

This grows naturally on poor land in moſt parts of North-America, where it never comes to a large ſize, and the wood is of little value. The bark is of a dark brown colour; the leaves are very broad at the top, where they have two waved indentures, which divide them almoſt into three lobes; they diminiſh gradually to their baſe, where they are narrow; they are ſmooth, of a lucid green, and have ſhort foot-ſtalks. The acorns are ſmaller than thoſe of the common Oak, and have ſhort cups.

11. QUERCUS *(Alba)* foliis obliquè pinnatifidis, ſinubus anguliſque obtuſis. Lin. Sp. Plant. 1414. *Oak with oblique many-pointed leaves, having obtuſe ſinuſes and angles.* Quercus alba Virginiana. Cateſb. Car. 1. p. 21. tab. 21. *The White Oak of Virginia.*

This ſort grows naturally in North-America, where the wood is eſteemed preferable to any of their other ſorts for building, being much more durable than any of them. The bark of this tree is greyiſh, the leaves are of a light green, ſix or ſeven inches long, and four broad in the middle; they are regularly indented almoſt to the midrib; the indentures are obtuſe, and have ſhort foot-ſtalks. The acorns of this greatly reſemble thoſe of the common Oak.

12. QUERCUS *(Phellos)* foliis lanceolatis integerrimis glabris. Flor. Virg. 149. *Oak with ſpear-ſhaped, entire ſmooth leaves.* Quercus foliis oblongis non ſinuatis. Cateſb. Car. 1. p. 17. *The Willow-leaved Oak.*

It grows naturally in North-America, where they diſtinguiſh two ſorts; one of them is called the Highland Willow Oak, which grows upon poor dry land; the

BOOK I. Botaniſts think, his Phegos, as producing the moſt edible fruit: But let us confine ourſelves to the Quercus Urbana, which grows more upright, and, being clean and lighter, is fitteſt for timber; and the Robur, or Quercus Silveſtris, (taking Robur for the general name, if at leaſt contra-diſtinct from the reſt) which, as the name imports, is of a vaſt robuſt and inflexible nature, of an hard black grain, bearing a ſmaller acorn, and affecting to ſpread in branches, and to put forth his roots more above ground; and therefore in the planting to be allowed a greater diſtance, viz. from twenty-five to forty feet, nay ſometimes as many yards; whereas the other, ſhooting up more erect, will be contented with fifteen. This

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leaves are of a pale green and entire, ſhaped like thoſe of the Willow-tree. The acorns are very ſmall, but have pretty large cups. The other grows in low moiſt land, and riſes to a much greater height; the leaves are longer and narrower, and the acorns are of the ſame ſize and ſhape, ſo that I ſuſpect their difference is owing to the ſoil in which they grow.

13. QUERCUS *(Ilex)* foliis oblongo-ovatis ſubtus tomentoſis integerrimis. Prod. Leyd. 81. *Oak with oblong, oval, entire leaves, which are downy on their under ſide.* Ilex folio anguſto non ſerrato. C. B. P. 424. *The narrow-leaved ever-green Oak.*

This ſpecies is generally known by the title of Ilex, or ever-green Oak; of this there are ſeveral varieties, which differ greatly in the ſize and ſhape of their leaves; but theſe will all ariſe from acorns of the ſame tree, as I have ſeveral times experienced; nay, the lower and upper branches of the ſame tree are frequently garniſhed with leaves, very different in ſize and ſhape from each other; thoſe on the lower branches being much broader, rounder, and their edges indented and ſet with prickles, but thoſe on the upper are long, narrow, and entire; ſo that I verily believe they are all but one ſpecies, except the Kermes Oak, which is undoubtedly a diſtinct ſort. The leaves of the Ilex are from three to four inches long, and one broad near the baſe, gradually leſſening to a point; they are of a lucid green on their upper ſide, but whitiſh and downy on their under, and are entire, ſtanding upon pretty long foot-ſtalks; theſe remain green all the year, and do not fall till they are thruſt off by young leaves in the ſpring. The acorns are ſmaller than thoſe of the common Oak, but of the ſame ſhape.

14. QUERCUS *(Gramuntia)* foliis oblongo-ovatis ſinuato-ſpinoſis ſeſſilibus ſubtus tomentoſis, glandibus pedunculatis. Sauv. Monſp. 96. *Ever-green Oak with oblong, oval, prickly, indented leaves, which are woolly on their under ſide, and bear acorns with foot-ſtalks.* Ilex folio agri-folii. Bot. Monſp. 140. *The Holly-leaved ever-green Oak.*

This ſort is ſuppoſed to be a different ſpecies; but of this I much doubt, having raiſed ſome plants from the acorns of the thirteenth, whoſe leaves are ſo like thoſe of this, as not to be diſtinguiſhed from them; theſe are ſhorter and broader than the

kind is farther to be diſtinguiſhed by its fulneſs of leaves, which tarniſh, and becoming yellow at the fall, do commonly clothe it all the winter, the roots growing very deep and ſtraggling. The author of Britannia Baconica ſpeaks of an Oak in Lanhadron-Park in Cornwall, which bears conſtantly leaves ſpeckled with white, and of another, called the Painted

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other, and approach in ſhape to thoſe of the Holly-tree, and are alſo ſet with prickles on their edges.

15. QUERCUS *(Coccifera)* foliis ovatis indiviſis, ſpinoſo-dentatis glabris. Prod. Leyd. 80. *Oak with oval, undivided, ſmooth leaves, which are prickly and indented.* Ilex aculeata, cocciglandifera. C. B. P. 425. *Prickly Kermes Oak.*

This is the Oak from which the kermes, or what is called ſcarlet grain, is collected, which is an inſect that harbours on this tree. It grows naturally in Provence and Languedoc, where it is known by the title d'Avaux. This is of ſmall growth, ſeldom riſing above twelve or fourteen feet high, ſending out branches on every ſide the whole length, ſo as to form a buſhy ſhrub; the leaves are oval and undivided; they are ſmooth on their ſurface, but indented on their edges, which are armed with prickles like thoſe of the Holly-tree. The acorns are ſmaller than thoſe of the common Oak.

16. QUERCUS *(Virginiana)* foliis lanceolato-ovatis integerrimis petiolatis ſempervirentibus. *Oak with ſpear-ſhaped, oval, entire leaves, which are ever-green, and have foot-ſtalks.* Quercus ſempervirens foliis oblongis non ſinuatis. Baniſt. *Ever-green Oak with oblong leaves which are not ſinuated, commonly called Live Oak in America.*

This kind grows naturally in Carolina and Virginia, where it riſes to the height of forty feet. The grain of the wood is hard, tough, and coarſe; the bark is greyiſh; the leaves are ovally ſpear-ſhaped, about three inches long and one and a half broad, entire, and of a dark green, ſtanding upon ſhort foot-ſtalks; they are of a thick conſiſtence, and continue green all the year. The acorns are ſmall, oblong, and have ſhort cups; they are very ſweet, ſo are eaten by the Indians, who lay them up in ſtore for the winter; they alſo draw a very ſweet oil from them, little inferior to that of ſweet Almonds. This is called the Live Oak in America.

17. QUERCUS *(Suber)* foliis ovato-oblongis indiviſis ſerratis ſubtus tomentoſis, cortice rimoſo fungoſo. Hort. Cliff. 448. *Oak with oval, oblong, undivided leaves, which are ſawed and woolly on their under ſide, and have a fungous cleft bark.* Suber latifolium ſempervirens. C. B. P. 424. *The broad-leaved ever-green Cork-tree.*

This ſort is the tree whoſe bark is the cork; of which there are two or three varieties, viz. one with a broad, another with a narrow leaf, which are ever-green; and

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Oak: others have ſince been found at Fridwood, near Sittingbourn in Kent; as alſo Sycamores and Elms in other places, mentioned by the learned Dr. Plot in his Natural Hiſtory of Oxfordſhire; which I only mention here, that the variety may be compared by ſome ingenious perſon thereabouts, as well as the truth of the fatal præ-admonition of Oaks.

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there is one or two which caſt their leaves in autumn, but the broad-leaved ever-green is the moſt common; the others may probably be only varieties ariſing by accident. The leaves of this are entire, of an oblong oval, about two inches long, and one and a quarter broad, ſawed on their edges, and have a little down on their under ſides; their foot-ſtalks are very ſhort; theſe leaves continue green through the winter till the middle of May, when they generally fall off juſt before the new leaves come out, ſo that the trees are very often almoſt bare for a ſhort time. The acorns are very like thoſe of the common Oak. The exterior bark of this tree is the cork, which is taken off from the trees every eight or ten years; but there is an interior bark which nouriſhes the trees, ſo that the ſtripping off the outer is ſo far from injuring them, that it rather prolongs their life; for thoſe whoſe bark are not taken off, ſeldom laſt longer than fifty or ſixty years in health; whereas the trees which are barked every eight or ten years, will live a hundred and fifty years and more. The bark of the young tree is porous and good for little; however it is neceſſary to take it off when the trees are twelve or fifteen years old, without which the bark will not be good, and after eight or ten years the bark will be fit to take off again; this ſecond peeling is of little uſe; but at the third peeling the bark is in perfection, and will continue ſo many years, for the beſt cork is taken from the old trees. The month of July is the time for ſtripping off this bark, when the ſecond ſap flows plentifully; this operation is performed with an inſtrument ſimilar to that for diſbarking Oak.

Beſides theſe ſeventeen Species of Oaks, enumerated by Mr. Miller, there is another deſcribed under the name of the Lucombe, or Devonſhire Oak. Of this new kind there is a particular account given in the 62d volume of the Philoſophical Tranſactions, in a letter from Mr. Holwell to Mr. Campbel. The following extract contains all that we yet know of this moſt ſurprizing ſpecies:

"About ſeven years paſt, Mr. Lucombe ſowed a parcel of acorns, ſaved from a "tree of his own growth, of the iron or wainſcot ſpecies; when they came up he "obſerved one amongſt them that kept his leaves throughout the winter; ſtruck with "the phænomenon, he cheriſhed and paid particular attention to it, and propagated, "by grafting, ſome thouſands from it, which I had the pleaſure of ſeeing, eight days "ago, in high flouriſhing beauty and verdure, notwithſtanding the ſeverity of the "winter. Its growth is ſtraight and handſome as a Fir, its leaves ever-green, and the "wood is thought, by the beſt judges, in hardneſs and ſtrength, to exceed all other

bearing ſtrange leaves: Beſides, we may note that famous Oak of New-Foreſt in Hampſhire, which puts forth its buds about Chriſtmas, but withers again before night; and, which was ordered (by our late King Charles the Second) to be incloſed with a pale, as I find it mentioned in the laſt edition of Mr. Camden's Britannia: Alſo another before this, which his grandfather, CHAP. III

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" Oak. He makes but one ſhoot in the year, viz. in May, and continues growing " without interruption; whereas other Oaks ſhoot twice, namely, in May and Auguſt; " but the peculiar and ineſtimable part of its character is, the amazing quickneſs of its " growth, which I imagine may be attributed (in ſome degree at leaſt) to its making " but one ſhoot in the year; for I believe all trees that ſhoot twice, are for ſome time " at a ſtand before they make the ſecond. I had the curioſity to take the dimenſions " of the parent tree, (ſeven years old) and ſome of the grafts; the firſt meaſured " 21 feet high, and full 20 inches in the girt; a graft of four years old, 16 feet high, " and full 14 inches in the girt; the firſt he grafted is ſix years old, and has outſhot " its parent two feet in height. The parent tree ſeems to promiſe his acorns ſoon, as " he bloſſoms, and forms his foot-ſtalk ſtrong, and the cup upon the foot-ſtalk with " the appearance of the acorn, which, with a little more age, will ſwell to perfection. " This Oak is diſtinguiſhed, in this country, by the title of the Lucombe Oak; his " ſhoots in general are from four to five feet every year, ſo that he will, in the ſpace " of thirty or forty years, outgrow in altitude and girt the common Oak at an hundred. " In two or three days I will forward to you, in a parcel, a branch which I cut off " from the original tree, and another from the graft of four years old, alſo a dead branch " of the Iron or Wainſcot Oak, juſt to ſhew that, from the ſimilarity of the leaves, it is a " deſcendant from that ſpecies, although differing from it in every other particular. " I ſend you alſo, by the Exeter ſtage, a ſpecimen of the wood. I have a walking-" pole full five feet long, a ſide-ſhoot from one of the grafts, only one year and a half " old. Several gentlemen round this neighbourhood, and in the adjoining Counties of " Cornwall and Somerſet, have planted them, and they are found to flouriſh in all " ſoils. I am, &c."

Exeter, Feb. 24, 1772.

The Oak, in the Linnæan ſyſtem, is ranked in the claſs and order *Monoecia Polyandria*, which comprehend ſuch plants as have male and female flowers on the ſame plant, the male flowers having numerous ſtamina.

We may expect to find flowers on the common Oak tree in the ſpring, though there is no exact time for the opening of the flowers or leaves, which depends much on the backwardneſs or forwardneſs of the ſeaſon, or the difference of the ſituation, or ſoil on which the trees ſtand. I have obſerved one Oak in full leaf, and at the ſame time another, ſtanding near it, without any ſuch appearance, owing to the coldneſs or poverty of the ſtratum on which it ſtood, and which would have been unperceived, had not the tree ſhewn it. But notwithſtanding this, obſervation and experi-

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King James, went to viſit, and cauſed benches to be placed about it; which giving it reputation, the people never left hacking of the boughs and bark till they killed the tree; as I am told they have ſerved that famous Oak near White-Lady's, which hid and protected our late Monarch from being diſcovered and taken by the rebel ſoldiers who were ſent to find him, after his almoſt miraculous eſcape at the battle of Worceſter. In the mean time, as to this extraordinary precoſeneſs, the like is reported of a certain Walnut-tree, as well as of the famous White-thorn of Glaſtonbury, and

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ence teach us, that theſe differences are very inconſiderable, and that the Oak which is moſt backward in putting forth its leaves, generally retains its verdure the longeſt in the autumn. In general, the flowers, which are of a yellowiſh hue, begin to open about the 7th of April; about the 18th the leaves appear, at which time the flowers are in full bloom; and about the 6th of May the leaves will be quite out, and remain until the autumnal froſts come on.

Oaks are generally raiſed in vaſt quantities together, called woods, where they thrive beſt, and arrive to a greater height than in hedge-rows, &c. We ſeldom ſee a good Oak in a hedge-row: They generally throw out large lateral branches, and form a ſpreading and beautiful head, but the trunk is for the moſt part very ſhort; whereas in woods they draw one another up, and thus ſoci. bly aſpire to ſuch a height, as to be ſufficient to anſwer any purpoſes in uſe.———Various are the opinions of mankind about the raiſing a wood of this tree. Some think they ſhould never be removed, but remain where the acorn was firſt planted; others, again, believe that a wood ſhould be raiſed by ſmall plants of Oak taken from a nurſery.———As each of theſe methods has its advantages, I ſhall therefore lay down rules, and ſhew the beſt mode of proceeding in raiſing an Oak wood both ways, that every one may chooſe that which he likes the beſt.

And, firſt, to raiſe a wood from acorns ſown in the *Seminary*.

Let a proper ſpot in the ſeminary be prepared againſt the time the ſeeds are ripe. The ſoil ſhould be loamy, freſh, and in good heart; and ſhould be prepared by digging it well, breaking all clods, and clearing it of weeds, roots, large ſtones, &c. The acorns ſhould be gathered from the ſtraighteſt, moſt thriving, and beautiful trees; and if they remain until they fall off of themſelves, they will ſucceed the better.

Having a ſufficient quantity of well-ripened acorns for your purpoſe, proceed to prepare your beds in the ground that is juſt got ready for their reception. Mark out the beds with a line, four feet broad, and let there be an alley between each bed two feet wide; rake the earth out of the bed into the ſpaces deſigned for the alley, until the bed be ſunk about two inches deep; ſow your acorns in the bed, about three inches aſunder, and gently preſs them down with the ſpade. Skim the earth that had been raked into the alleys over the acorns, until it be raiſed about two inches above them; then, after having dreſſed up the bed and alley, and gently preſſed it down with the back of

Black-thorns in ſeveral places. Some of our common Oaks bear their leaves green all winter; but they are generally Pollards, and ſuch as are ſheltered in warm corners and hedge-rows. To ſpeak then *particularly* of Oaks, and *generally* of all other trees of the ſame kind, by ſome infallible characters, notice ſhould be taken of the manner of their ſpreading, ſta-

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the ſpade, proceed to the next bed, and ſo on until the whole be finiſhed. After this ſet traps at proper diſtances, all over the beds; for if the mice find the acorns out, they will ſoon deſtroy the greateſt part: The crows alſo, ſhould they diſcover them, will be extremely troubleſome. As ſoon as theſe latter are perceived to frequent the beds, ſome of them muſt be ſhot, and hung upon gibbets *in terrorem*, with their wings expanded, and their bills pegged open, into which ſome gunpowder ſhould be put. This work is beſt performed in February, though ſome prefer the autumnal months.

In about ſix weeks the plants will appear above ground; and in theſe beds they may remain for two years, without any further trouble or care than keeping them clean from weeds, and now and then refreſhing them with water in very dry weather.

When the young trees are two years old, they will be of a proper ſize for planting out. Let us now ſee in what manner the ground deſigned for the wood is to be prepared to receive them. The beſt and only true way is by trenching, or double digging, as deep as the ſoil will admit of: But as this is a very expenſive proceeding, and conſequently would be practiſed by few, I ſhall point out another good method of preparing the ground for the reception of Oak plants for the raiſing a wood. This is to be done by proper plowing; and, if you chooſe it, the year before it is planted it may bear a crop of oats, barley, or turnips. By this means the ſward will be effectually rotted, and the ſoil become more pliable for the other preparations. After the crop is off, let the ground be plowed very deep, and then harrowed with heavy harrows to break the clods: About the end of October let it be plowed again croſs-ways, and harrowed as before. This is the ſeaſon for planting of the ſets; for the ground, by being thus croſs-plowed deep and harrowed, will be in proper order for their reception. The manner of planting the ſets is as follows:

Firſt, carefully take the plants out of the ſeed-bed, ſhorten the tap-root, and take off part of the ſide-ſhoots, that there may be an equal proportion of ſtrength between the ſtem and the root. If the wood is deſigned to be but ſmall, ten, twenty, or thirty acres, then lines may be drawn, and the trees planted in rows, four feet diſtance from row to row, and the trees two feet aſunder in the row: Each line muſt have a man and a boy for planting. The ground being made light and pliable with croſs-plowing and harrowing, the man ſtrikes his ſpade into the earth cloſe to the line; he then takes it out and gives another ſtroke at right angles with it; then the boy, having a parcel of plants under his left arm, takes one with his right hand, and readily puts it into the crevice made by the ſpade at the ſecond ſtroke: after this the man gently preſſes the mould to it with his foot, and thus the young Oakling is planted. He proceeds in the ſame manner to the next, and ſo on till all is finiſhed. An active man

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ture and growth, ſhape and ſize of the Acorn, whether ſingle or in cluſters, the length or ſhortneſs of the ſtalks, roundneſs of the cup, breadth, narrowneſs, ſhape and indentures of the leaf; and ſo of the bark, aſperous or ſmooth, brown or bright, &c. Though moſt, if not all of them, may rather be imputed to the genius and nature of the ſoil, ſitu-

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will, with his boy, plant 1500 or 2000 in a day; and while they are planting, others ſhould be employed in taking up freſh ſets from the ſeed-bed, ſorting them, and preparing their roots. In ſhort, a ſufficient number of hands ſhould be ſet to every part of this work, that the whole may be carried on with diſpatch; for the ground cannot be too ſoon furniſhed with its plants, after it is in readineſs to receive them; neither can the plants be put too early into the ground, after they are taken up from the ſeminary.—Thoſe plants which are nearly of the ſame ſize ſhould be made to occupy a large quarter together, and the weakeſt may be rejected, if there are enough for the purpoſe; or they may be left in the ſeminary a year longer, to gain ſtrength.

The trees, either for ſmall or large plantations, being in the ground, the firſt care ſhould be to fence them well from cattle, and even, if poſſible, from rabbits and hares. The next ſhould be, to keep them clear from weeds, that they may not be incommoded in their vegetating progreſs. Some land is more prolific of weeds than others, but in all they muſt be carefully watched, and deſtroyed at their firſt appearance. In ſmall plantations hoeing may do; but where the plantations are large and noble, a double-ſhelving plow muſt be provided; and when the weeds are got two or three inches high, this muſt be drawn exactly down the middle of each row by horſes with their mouths muzzled, ſomebody leading the foremoſt horſe: this plow will effectually throw a ridge each way, ſo that the edge of it will be almoſt contiguous to the plants on either ſide. This being done, the whole ſurface of the ground will be changed, and the weeds all buried, except a few about the ſtems of the plants, which a man following the plow ſhould be ready to cut or pluck up. In this manner the ground may lie until a freſh crop of weeds preſent themſelves; when theſe are about three inches high, a common plow ſhould be provided to go up one ſide of the row and down the other, to plow the ridges made by the double-ſhelving plow, into their former places, men following with hoes to deſtroy ſuch weeds as are near the ſtems of the trees. Thus will the whole ſcene be changed again; the ground will appear as new tilled; and in this condition it may remain until the weeds call for the double-ſhelving plow a ſecond time, which muſt alſo be followed alternately with the common plow, as occaſion may require. By this means the ground will not only be kept clean of weeds, but the earth, by conſtant ſtirring, will be more replete with vegetating juices, the gentle ſhowers will produce their good effects, the ſun will have his influence, and all the powers of vegetation will combine to nouriſh and ſet forward the infant Oak. This work muſt be repeated every year, until the Oaks are of a height ſufficient to deſtroy the weeds, which may be, perhaps, in three or four years, according to the goodneſs of the ground in which they are planted.——Thus you have

ation or goodneſs of the ſeed, than either to the pretended ſex or ſpecies. And theſe obſervations may ſerve to diſcover many accidental varieties in other trees, without nicer diſtinctions, ſuch as are fetched from profeſſed botaniſts, who make it not ſo much their ſtudy to plant and propagate trees, as to ſkill in their medicinal virtues, and other uſes; always CHAP. III.

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a wood planted with young Oaks taken from the nurſery or ſeed-bed. I ſhall now proceed,

Secondly, to the raiſing of an Oak wood from the acorn. Having the ground prepared, as before directed, for the reception of the young Oak plants, and having a ſufficient quantity of acorns, all gathered from under the moſt vigorous, healthy, and thriving trees, proceed to their planting in the following manner: In the months of February and March, let lines be drawn acroſs the ground for the rows, between which let there be four feet diſtance; but if this be thought too great an interval, the rows may be made at three feet, in which caſe the acorns muſt be put down at ſomewhat a greater diſtance from each other. Then having ſticks properly rounded to make the holes, plant the acorns by the ſide of the lines, at the diſtance of ten inches aſunder: let them be put down about two inches below the ſurface, and ſee that the earth be properly cloſed by the planting ſtick, to prevent the mice, or crows, from injuring the ſeed. In ſome places it is cuſtomary to ſow the acorns after the plow; but where the ground happens to be ſtiff, great care ſhould be taken not to cover the ſeed with too thick a furrow. As in this manner of ſowing, the plants will come up very irregular, the mode of thinning muſt be left to the diſcretion of the planter. But to return.

The firſt year after planting the acorns, the weeds muſt be kept down by hoeing and hand-weeding; and this muſt be done early in the ſpring before the weeds get ſo ſtrong as to hide the tender plants, which would occaſion many of them to be deſtroyed in cleaning. It is alſo the cheapeſt, as well as the neateſt huſbandry, to take weeds down before they grow too large; for though the ground may require an additional hoeing in the ſpring, yet the weeds being hoed down when young, a man may hoe over a greater quantity of ground in a day: Weeds cut in their tender ſtate immediately die; whereas, when they are ſuffered to grow old and ſtrong, they frequently grow again, eſpecially if rain falls ſoon after—perfect their ſeed in a ſhort time—and thereby poiſon the ſoil of the whole plantation.

The ſecond year of their growth, in ſuch extenſive plantations as require them, the double-ſhelving and common plow may be made uſe of, as before directed, to cultivate and keep the ground clean; and this culture ſhould be attended to until the plants are become ſo large that it will not be in the power of the weeds to injure them. As plantations of Oaks from the acorn are rather precarious, it will be right to form a ſmall ſeminary in the ſame field, to repair the intervals that may have miſcarried. And here it may be neceſſary to obſerve, that this ſeminary ſhould be taken from the

Book I. excepting our learned countryman Mr. Ray, whoſe incomparable work omits nothing uſeful or deſirable on this ſubject, wanting only the accompliſhments of well-deſigned ſculps. There is likewiſe a kind of Hemeris, or Dwarf-Oak, (like the Robur vii. Cluſii) frequent in New-England;

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beſt part of the field, and in the warmeſt ſituation, in order that the young plants may have good roots, without which they would make but an indifferent progreſs when planted out.

Having thus given directions for the raiſing of woods, both by young ſets and from acorns, I now proceed to their future management, which muſt be the ſame in both.—And firſt, the rows being four feet aſunder, and the plants two feet diſtant in the rows, they may ſtand in this manner for twelve or fourteen years, when every ſecond plant may be taken out and ſold for hoops or ſmall poles. Now, though I ſay in twelve or fourteen years the plants will be of uſe for theſe purpoſes; yet this is only a general rule, as the different goodneſs of the land will make a great variation in the growth of the plants; and conſequently, if the trees take to growing well, they will want thinning ſooner. This buſineſs, therefore, muſt be left to the diſcretion of the perſon intruſted with the care of the plantation.

After every ſecond plant is taken away, let the roots be grubbed up, not only becauſe they will pay for grubbing as fire-wood, but that there may be more room given for the ſtanding plants freely to extend their roots.

The plants being now four feet aſunder each way, they will require no more thinning for ſeven or eight years, when the healthieſt and beſt thriving trees muſt be marked to ſtand for timber, and the others cut down for poles, and their roots left to produce future under-wood.

In this manner the rows filled with plants from the nurſery muſt be managed, in which caſe we can ſpeak with preciſion with regard to thinning. The ſame cleanneſs of huſbandry muſt be applied to the rows under cultivation from the ſeed, but the planter in this laſt method muſt be left to form his own ideas in reſpect to thinning, as no human knowledge can determine, before-hand, how thick the ſeedling plants will appear in the rows. In rocky and mountainous ſoils, the plants or acorns muſt be put down irregularly by the ſpade, and the planter muſt be directed in this operation by the particular circumſtances of the ſoil and ſituation.

In all caſes of planting, ſhelter and warmth are particularly required. Where the plantations are flat, it may be adviſeable to ſkirt the wood with Scotch Fir, which, being a hardy and quick-growing tree, is well calculated for this purpoſe.

Birch is ſometimes put between the rows of Oaks, and in mountainous ſituations this is a good method; others recommend the Fir for this purpoſe, but it is apt to vegetate too faſt and over-top the Oaks.

I ſhall now conſider our plantation as far advanced, in which caſe a particular attention ſhould be paid to the trees planted for timber. Theſe ſhould ſtand from twenty to thirty feet diſtant from each other, which will not be too near where the

and the white one of Virginia, a moſt ſtately tree, which (bearing acorns) might eaſily be propagated here if it were worth the while. CHAP. III.

3. I ſhall not need to repeat what has already been ſaid, chap. ii. concerning the raiſing of this tree from the Acorn; it will alſo endure the laying, but never to advantage of bulk or ſtature. It is in the mean time

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trees thrive well; in which caſe their heads will ſpread, ſo as to meet in about thirty or thirty-five years; nor will this diſtance be ſo great as to impede the upright growth of the trees. This diſtance is recommended, that the trees may enjoy the whole benefit of the ſoil; therefore, after one crop of the under-wood, or at the moſt two crops are cut, I would adviſe the ſtubbing up the ſtools, that the ground may be entirely clear for the advantage of the growing timber, which is what ſhould be principally regarded; but, in general, moſt people attend more to the immediate profit of the under-wood than the future good of the timber, and frequently by ſo doing ſpoil both; for if the under-wood be left after the trees have ſpread ſo far as that their heads meet, the under-wood will not be of much worth; and yet, by their ſtools being left, they will draw away a great ſhare of nouriſhment from the timber-trees, and retard them in their growth.

Such Gentlemen as are deſirous of raiſing Oaks to plant out for ſtandards, either in parks or in fields, for clumps, or for avenues, muſt train them in the following manner: Having raiſed them in the ſeed-bed, as was before directed for woods, let them remain there two years; after which a piece of good ground muſt be prepared for their reception, where they muſt grow until they are of a ſize ſufficient to be planted out where they are deſigned to remain. This ground muſt be trenched, or double dug; then, taking the plants out of the ſeed-bed, as before directed, let a man and boy plant them upon this new double-dug ground, at the diſtance of two feet row from row, and a foot and half aſunder in the rows. Every winter, until the plants are taken out of this nurſery, the ground ſhould be dug between the rows; and this is what gardeners call *turning-in*. They will require no other pruning than taking off any unſightly ſide-ſhoot; or, where the tree is inclined to be forked, taking off the weakeſt branch. Nor is any other precaution neceſſary, until the time of their being planted out to continue, which muſt be done as follows:

Firſt, carefully take the trees out of the nurſery, and then prune the roots, which muſt be done by holding the plant in your left hand, that the ſtroke of the knife in the right may ſo cut the bottom of the root that the wound may be downwards; next, take off all bruiſed and broken parts of the root; and having holes prepared, in the figure of a circle, three feet in diameter and a foot and half deep, (the ſward being worked and chopped ſmall in the bottom of the holes, and ſome mould laid to cover it) plant the trees in ſuch a manner that the top of the roots may be nearly level with the ſurface of the ground. Let the fineſt of the mould which was under the turf

Book I. the propagation of theſe large ſpreading Oaks, which is eſpecially recommended for the excellency of the timber, and that his Majeſty's foreſts were well and plentifully ſtored with them, becauſe they require room and ſpace to amplify and expand themſelves, and ſhould therefore be planted at more remote diſtances, and free from all incumbrances: And this upon conſideration, how ſlowly a full-grown Oak mounts upwards, and how

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be preſerved to lap the root in; and, after the earth has regularly filled the hole, let it be preſſed down with the foot, to ſettle it properly to the root. A little litter ſhould be laid over the root, to prevent the wind and ſun from drying the mould, and thereby retarding the growth of the tree, eſpecially if the planting be deferred till the ſpring. Theſe plants, being of a larger ſize, ſhould be properly ſtaked to ſecure them from the violence of the winds; or, if they are planted where cattle or deer can come, they ſhould be properly hurdled. After this, they will require no farther care.

Oaks will not aſpire to ſuch height, or fineneſs of trunk, when planted in theſe places, as in woods; but they will form moſt beautiful heads, and their ſhade will be extenſive and large. Mr. Maſon, in his dramatic Poem called Caractacus, gives a beautiful deſcription of ſuch trees:

——————————— Behold yon Oak,
How ſtern he frowns, and with his broad brown arms
Chills the pale plain beneath him.

The Oak will grow and thrive upon almoſt any ſoil, provided the trees be properly planted, though we cannot ſuppoſe that their growth will be equal in all the ſorts: A rich deep loamy earth is what Oaks moſt delight in, and in ſuch they will arrive at the greateſt magnitude in the feweſt years; tho' they grow exceedingly well in clays of all kinds and on ſandy ſoils, in which laſt the fineſt-grained timber is produced. Many fine trees of this texture may now be ſeen growing upon Nottingham foreſt, particularly at Welbeck.

Having thus given a minute detail of the different methods of raiſing an Oak wood from the *Acorn*, the *Seed-bed*, and the *Nurſery*, we are now arrived at a very important and intereſting queſtion: Which makes the beſt Timber? Mr. Evelyn decides for ſowing; and if a careful obſerver will look into the woods that have been ſown, and at the ſame time examine ſuch as have been planted, he will not heſitate a moment to declare in favour of the excellent Author of this Treatiſe. The extenſive plantations that have been carried on for theſe many years paſt, have been made more with a view to Shade, Shelter, and Ornament, than to the propagation of Timber; and, in order to obtain theſe ends in the moſt expeditious manner, the owners have in general followed a miſtaken notion, and planted their trees too old; ſo that many of theſe woods, when they come to be felled, will greatly diſappoint the expectations of the purchaſers. Beſides, ſuch advanced trees when drawn from the nurſery, unleſs planted in a good ſoil, will never come to timber. On the contrary, rocky and poor ſoils may be made to

ſpeedily it ſpreads and dilates itſelf to all quarters, by dreſſing and due culture, ſo as above forty years advance is to be gained by this only induſtry: And if thus his Majeſty's foreſts and chaſes were ſtored, viz. with this ſpreading tree at handſome intervals, by which grazing might be improved for the feeding of deer and cattle under them (for ſuch was the old

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produce excellent timber by judiciouſly ſowing the ſeeds, and carefully defending the young plants from the browſing of ſheep and cattle, or the cropping of hares and rabbits. By this practice, the plants are attached to their native earth, and are ſtrangers to the inconveniences that trees drawn from a nurſery are expoſed to.

In Scotland, and in ſome of the northern counties of this kingdom, the practice of ſowing their waſte lands with Acorns, Cheſnuts, Beech-maſt, Fir-ſeeds, Aſh-keys, &c. is much recommended, and there is not the leaſt doubt but that Poſterity will enjoy the benefits ariſing from this judicious practice. The expence attending the ſowing an acre of waſte land with various ſeeds of foreſt-trees, is trifling when compared with that of planting; and if all other things were equal, that alone would be deciſive. Charles Turner, Eſq; of Kirkleatham, in the county of York, has within theſe few years ſown upwards of 400 acres of waſte and moor land with the various ſeeds of foreſt-trees, and I am credibly informed that he intends to ſow 100 acres annually, for a ſeries of years; ſo that ſhould his example be followed, and there is no doubt but it will, in conſequence of his preſent ſucceſs, we ſhall in half a century ſee our rocky, moor, and barren lands covered with wood to the advantage of the riſing generation. In the neighbourhood of coal and lead mines, and iron forges, ſuch woods will become highly profitable at an early period; and conſidering the great demand that is conſtantly made from ſuch places for all kinds of wood, it is matter of ſurprize that the cheap method of raiſing woods from ſeeds and ſeedling plants, has been ſo long neglected. As example is always better than precept, I beg leave to recommend a view of Mr. Turner's eſtate at Kildale, to ſuch Gentlemen as wiſh to bring their weak, rocky, and moor lands into the moſt profitable cultivation. The following method was there practiſed.

The men being divided into parties, each conſiſting of three men, the firſt man with a paring ſpade took up a turf in the uſual manner. The ſecond man ſtirred the earth with a ſpade, and the third diſtributed the acorns, cheſnuts, fir-ſeeds, &c. and afterwards covered them. Where the ſoil was ſhallow, or gravelly, the ſecond man chopped the turf down to the gravel, or rock, after which the third man introduced the ſeeds, and cloſed the earth. In ſome places, ſeedling Firs, Larches, and Oaks were put down in the place of ſeeds, which, from their *youth*, were ſoon reconciled to their change of ſituation; and this practice was highly judicious:

Mutatam ignorent ſubito ne ſemina matrem. VIRG.

Had they been plants of three or four years growth, it is more than probable that by far the greater number would have died. It fared otherwiſe with the infant plants. By attending to the above regular mode of ſowing, and ſeedling planting, an exten-

BOOK I. Saltus) benignly viſited with the gleams of the ſun, and adorned with the diſtant landſcapes appearing through the glades and frequent valleys, nothing could be more raviſhing. We might alſo ſprinkle fruit-trees amongſt them for cyder, and many ſingular uſes, and ſhould find ſuch goodly plantations the boaſt of our rangers, and foreſts infinitely preferable to

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ſive tract of country may be covered with wood in a few years, at a moderate expence. The work, when conducted in this manner, ſhould be performed very early in the ſpring; but in ſuch lands as are apt to ſwell after froſts, it will be beſt to remove the turf, and ſtir the ſoil in the autumn previous to ſowing, whereby the earth will become more ſolid, and the infant plants be leſs liable to be thrown out in winter. And here it will be neceſſary to give another caution of ſome moment to the planter. Moor earth conſiſting of looſe and uncorrupted vegetable fibres, becomes ſoon dry after planting, ſo that the nick made for the reception of a ſeedling plant frequently opens and expoſes the root to the action of the ſun. In ſuch places the ſoil ſhould be well ſtirred, and the plants put down very early in the ſpring, taking care to fix the earth as cloſe to the roots as poſſible.

In ſome parts of Scotland, the ſeedling firs are put into the earth without any ſort of preparation. A hole being bored through the heath with an iron inſtrument, made in the form of a large gimblet, the ſeedling is immediately introduced. By this management the ſoil is prevented from opening in hot weather to the prejudice of the young plant. Inſtead of being pointed, the inſtrument is flattened at the extremity, like a chiſſel with a nick in it, by which the plant is drawn down to the bottom of the hole made to receive it. But of this I ſhall probably have occaſion to ſpeak more fully in the chapter upon Firs.

I have already remarked, that under every circumſtance of ſowing or planting, eſpecially the former, the utmoſt care muſt be taken to fence off the young plants, leſt cattle and ſheep ſhould break in and render the pains of the planter abortive:

Texendæ ſepes etiam, et pecus omne tenendum eſt:
Præcipue dum frons tenera imprudenſque laborum:
Cui ſuper indignas hyemes, ſolemque potentem,
Sylveſtres uri aſſiduè capreæque ſequaces
Illidunt: Paſcuntur oves, avidæque juvencæ.
Frigora nec tantum canâ concreta pruinâ
Aut gravis incumbens ſcopulis arentibus æſtas;
Quantum illi nocuere greges, durique venenum
Dentis, et admorſo ſignata in ſtirpe cicatrix. VIRG.

As ferns, and graſſes of every kind, are great enemies to plants raiſed from ſeeds, the utmoſt care muſt be taken to keep the woods, during their infancy, as clear from them as poſſible. Tall fern will ſometimes twine about ſown Oaks of two feet high, and bend them to the ground, to the utter deſtruction of the wood, unleſs properly noticed. However, in poor land the fern is ſeldom poſſeſſed of ſuch a deſtructive

any thing we have yet beheld, rude and neglected as they are. I ſay, when his Majeſty ſhall proceed, as he hath deſigned, to animate this laudable pride into faſhion, foreſts and woods, as well as fields and incloſures, will preſent us with another face than now they do. And here I cannot but applaud the worthy induſtry of old Sir Harbotle Grimſtone, who, I am told, from a very ſmall Nurſery of Acorns, which he ſowed in the neglected corners of his ground, did draw forth ſuch numbers of Oaks of

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luxuriancy. The expence of fencing and keeping the land clear from graſs and weeds will be abundantly repaid in the increaſe and vigour of the wood, and ſhould upon no account be diſpenſed with.

Under ſome particular circumſtances, it may be proper to cover rocky and expoſed ſituations with Oaks raiſed in a nurſery. In ſuch caſes we ſhould always plant from the ſeed-bed; and in order to bring up the young Oaks, where the aſpect and ſituation happen to be unfriendly, it ſhould be recommended to ſkirt the wood, to a ſufficient thickneſs, with Scotch firs, mixing ſome of them in the body of the wood. In this manner an expoſed ſituation may be made to produce excellent timber; and when the trees are grown to a ſize ſufficient for their own protection, the firs in the centre, which I call the nurſes, ſhould be removed, otherwiſe they will injure the young Oaks:

——————————— Foſter'd thus,
The cradled hero gains from female care
His future vigor; but, that vigor felt,
He ſprings indignant from his nurſe's arms,
He nods the plumy creſt, he ſhakes the ſpear,
And is that awful thing which heav'n ordain'd
The ſcourge of tyrants, and his country's pride. MASON.

On the judicious thinning and cleaning a young wood, depends much of the planter's ſucceſs and profit; on which account all gentlemen who engage deeply in planting will find it highly neceſſary to appoint proper perſons, whoſe office ſhall be ſolely confined to the ſuperintendance of the woods. From a neglect in this particular, the hopes of half a century may be thrown away in a period of a few years.

The method of ſeedling-planting comes neareſt to the nature of ſowing, and is generally connected with it in all large undertakings; but I muſt refer the reader to the notes upon the different foreſt-trees in the courſe of this work, where the judicious practice of planting from the ſeed-bed is occaſionally recommended.

It often happens, from natural or accidental cauſes, that planted Oaks grow ſtunted and crooked; in ſuch caſes they ſhould be cut down at a proper ſeaſon. In conſequence of this judicious practice, a clean leading ſhoot will be obtained that will ſoon overtake the cotemporary trees that have not undergone the ſame operation. But it muſt be conſidered that no Oak ſhould be thus headed down till two or three years after planting, or until it has compleatly rooted itſelf in the ground. Many other

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competent growth, as being planted about his fields in even and uniform rows, about one hundred feet from the hedges, buſhed and well watered till they had ſufficiently fixed themſelves, did wonderfully improve both the beauty and the value of his demeſnes. But I proceed.

4. Both theſe kinds ſhould be taken up very young, and tranſplanted about October; ſome yet, for theſe hardy and late ſpringing trees, defer it

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kinds of Foreſt-trees, under ſimilar circumſtances, may be treated in the ſame manner; but we muſt except all the Pine tribe from this operation, as in them the loſs of the leading ſhoot is the certain loſs of the tree.

An opinion generally prevails, that good land ſhould always be employed in Meadow, Paſture, and Tillage, and that none but the barren and rocky ſoils ſhould be planted. Such an idea is by no means founded on truth, as it may be demonſtrated, that good land lying remote from a town, and near a navigable river or canal, will yield a better profit when planted, than if it had been employed in paſturage and tillage. There is, I confeſs, ſome difference, when we conſider that in the one caſe the profits are annual and ſmall, and in the other diſtant and large, which circumſtance muſt materially affect the inclinations of ſome people; but a true patriot, and all planters are patriots, will forego the preſent profits, and reſt ſatisfied with having handed down to poſterity a bleſſing of ineſtimable value. Full of this idea, the patriot will ſet apart ſome good lands for the generous purpoſe of raiſing timber, which at ſome future periods may be employed in building ſhips for the advancement of our commerce and the ſecurity of our iſland:

Let India boaſt her plants, nor envy we
The weeping amber and the balmy tree,
While by our Oaks the precious loads are born,
And realms commanded which thoſe trees adorn. POPE.

As a farther encouragement to the generous planter, it may be remarked that the beſt lands always produce the cleaneſt, quickeſt, and beſt growing timber; at the ſame time, the under-wood ſprings up with an amazing and profitable luxuriancy. To ſuch men the ſoil is always grateful.

When a large tract of land is deſigned for wood, eſpecially if it be of an indifferent quality, it may be advantageous to attend to the following method, which was recommended to me by a gentleman long converſant in the practice of raiſing woods. But it muſt be obſerved, that this method can only be complied with in places where the plow can be introduced.

Plow the whole in October or November, and in the following ſpring plow and harrow ſo as effectually to deſtroy the turf. The land being reduced to an excellent tilth, ſow it with turnip-ſeed about the third week in June, and when the plants are ſufficiently advanced let them be carefully hoed, which operation muſt be repeated at a proper interval. After this the crop, if poſſible, ſhould be eaten upon the ground with ſheep. Upon the ſame land another crop of turnips ſhould be taken the ſucceed-

till the winter be well over, but the earth had need be moiſt; and though they will grow tolerably in moiſt grounds, yet do they generally affect the ſound, black, deep, and faſt mould, rather warm than over wet and cold, and a little riſing, for this produces the firmeſt timber; though my Lord Bacon prefers that which grows in the moiſter grounds for ſhip-timber, as

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ing year; after which the ground will be in clean and excellent condition for receiving the acorns and ſeeds of Foreſt-trees. Theſe ſhould be committed to the earth in the following manner:

Early in the ſpring, upon one plowing, ſow one buſhel, or three pecks, of oats, and at the ſame time ſow the neceſſary quantity of acorns, cheſnuts, aſh-keys, beech-maſt, fir-ſeeds, &c. After this, let the whole be harrowed to cover the ſeeds. As in all extenſive tracts there are a variety of ſoils, it will be moſt judicious to ſow the different ſeeds upon ſuch parts as are moſt ſuitable to their reſpective natures. Beſides, ſome trees, though they delight in the ſame ſort of ſoil, do not grow kindly together; ſo that the planter will do well to conſider this, and only mix ſuch together as are found, by general practice, to grow friendly to each other. And here I beg leave to remark, that where the turnips are cultivated in drills and well horſe-hoed, the land will be in better condition for receiving the acorns, &c. than if the broad-caſt method had been purſued.

In this manner an extenſive wood may be raiſed at a ſmall expence, as the turnip and oat crops will pay the expence of plowing, rent, and incidental charges. The tender plants being nouriſhed, warmed, and protected by the oat ſtalks, will make vigorous ſhoots, and, having no weeds to ſtruggle with the firſt ſummer, will puſh forward with amazing vigour. As the land ſown in this manner will be fully ſtocked with plants, the feet of the reapers employed in cutting down the oats will not materially affect the ſeedling Oaks, which before the autumn will have made a conſiderable progreſs. The Firs, from the ſlowneſs of their growth, will be ſecure from injury, and the Aſhes cannot be hurt, as they do not vegetate till the ſecond year. In ſome parts of Norfolk, where the land, in general, is of a ſandy nature, with a bed of clay or marl underneath, it is recommended by the author of the above inſtructions, to raiſe an Oak wood by ſowing the acorns with a crop of ſpring rye; and I am well informed of the ſucceſs of that method in one inſtance.—A wood raiſed in this natural manner will not only make the beſt timber for the uſes of the carpenter and ſhip-builder, but will arive at maturity many years ſooner than one of the ſame age raiſed from plants drawn from the nurſery. The tap-root of all trees correſponds with the leading ſhoot; ſo that when it is cut off, as in planting from the nurſery, the tree is weakened in its leading ſhoot, but puts out more vigorouſly in its lateral ones. An attention to the correſpondence between the branches and roots ſolves many of the phænomena in pruning and planting.

A wood raiſed in this cheap and eaſy manner may be thinned at proper ſeaſons, leaving the moſt thriving trees to ſtand for timber, or (which is the moſt profitable way)

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the moſt tough, and leſs ſubject to rift. But let us hear Pliny: "This "is a general rule", ſaith he, "what trees ſoever they be which grow tole- "rably, either on hills or vallies, ariſe to greater ſtature, and ſpread more "amply in the lower ground; but the timber is far better, and of a finer "grain, which grows upon the mountains, excepting only Apple and

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it may be converted into a ſpring wood, in which caſe no timber ſhould be left ſtanding, as the copſe wood will be retarded in its growth by the over-dripping of the large trees. According to the goodneſs of the land, the ſpring wood will arrive ſooner or later at maturity; and as wood of that kind is a regular and conſtant income, after a term of years, it becomes a very advantageous method of applying land in all countries where fuel is dear.

As much depends upon keeping the ſeedling plants clear from weeds, it might be an improvement to the plan, if, after the oats are harrowed in, drills were drawn with a light plow all over the field at the diſtance of four feet from each other. Into theſe let the acorns, cheſnuts, and other ſeeds be ſown, after which they may be covered with rakes; the thickneſs, however, of the covering, and the deepneſs of the drills, muſt be regulated by the nature of the ſoil and the ſeed ſown. A wood raiſed in this manner may be cleaned at a ſmall expence by horſe-hoeing the intervals, and hand-hoeing and thinning the rows at proper ſeaſons; for which neceſſary operations conſult the directions already given for cleaning Oaks drawn from the nurſery, and planted in rows.

The celebrated Marquis of Turbilly, ſpeaking of woods raiſed from ſeeds, ſays, "Woods thus raiſed out-grow, even in a few years, thoſe that have been planted at the ſame time, and cultivated by digging and dreſſing at a great expence. No trees are taller, ſtraighter, and of a finer bark."

In this place I judge it neceſſary to remark, that the above directions are drawn from the moſt approved authors, as well as the private information of Gentlemen well converſant in the practice of planting; but as all countries differ in a variety of circumſtances, I wiſh to be underſtood as only laying down rules ſubject to a neceſſary variation. There is nothing ſo dangerous in planting as obeying too ſervilely the directions given in books: ſomething muſt be left to the planter himſelf.

I have a particular ſatisfaction in laying before my readers the following letter, written by Mr. Speechly, gardener to his Grace the Duke of Portland, deſcribing the method of forming plantations upon the Duke's eſtate in the county of Nottingham. It is a valuable piece of practical information, and merits our utmoſt attention.

——————"Few Noblemen plant more than his Grace the Duke of Port- "land; and I think I may ſay, without vanity, none with greater ſucceſs. But as "no man ſhould think of planting in the very extenſive manner that we do, be- "fore he is provided with well-ſtocked nurſeries, it may not be amiſs, before I proceed "further, to give a ſhort ſketch of that neceſſary buſineſs, as alſo to inform you of

Pear trees." And in cap. xxxix. lib. xvi. " The timber of thoſe trees " which grow in moiſt and ſhady places is not ſo good as that which comes " from a more expoſed ſituation, nor is it ſo cloſe, ſubſtantial, and dura-ble:" Upon which he much prefers the timber growing in Tuſcany, before that towards the Venetian ſide, and upper part of the Gulph. And that timber ſo grown was in greateſt eſteem long before Pliny, we have the ſpear of Agamemnon ἔχων ἀνεμοτρεφὲς ἔγχος. Il. λ. formed from a tree ſo expoſed; and Didymus gives the reaſon, Τὰ γὰρ ἐν ἀνέμῳ πλεῖον γυμναζόμενα δένδρα στερεά, &c. " For that being continually weather-beaten, they become hardier and tougher: Otherwiſe, that which is wind-ſhaken never

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" the ſoil and ſituation of our ſeat of planting. The greateſt part of our plantations " is on that ſoil, which in Nottinghamſhire is generally diſtinguiſhed by the name of " Foreſt-land. It is a continuation of hills and dales; in ſome places the hills are " very ſteep and high; but in general the aſcents are gentle and eaſy.

" The ſoil is compoſed of a mixture of ſand and gravel; the hills abound moſt with " the latter, and the vallies with the former, as the ſmaller particles are by the wind " and rains brought, from time to time, from the high grounds to the lower. It is " on the hilly grounds we make our plantations, which in time will make the vallies " of much greater value, on account of the ſhelter they will afford.

" After his Grace has fixed on ſuch a part of this Foreſt-land as he intends to have " planted, ſome well-ſituated valley is choſen (as near the center of the intended " plantations as may be) for the purpoſe of a nurſery; if this valley is ſurrounded with " hills on all ſides but the ſouth, ſo much the better. After having allotted a piece of " ground, conſiſting of as many acres as is convenient for the purpoſe, it is fenced " about in ſuch a manner as to keep out all obnoxious animals. At either end of the " nurſery are large boarded gates, as alſo a walk down the middle, wide enough to " admit carriages to go through, which we find exceedingly convenient when we re-" move the young trees from thence to the plantations. After the fence is compleated, " the whole is trenched (except the walk in the middle) about twenty inches deep, " which work may be done for about three pounds ten ſhillings, or four pounds, per " acre, according as the land is more or leſs gravelly; this work is beſt done in the " ſpring when the planting ſeaſon is over. If after the trenching, two or three chal-" drons of lime be laid on an acre, the land will produce an excellent crop either " of cabbages or turnips, which being eaten off by ſheep in the autumn, will make " the land in fine order for all ſorts of tree-ſeeds: But as the Oak is the ſort of " tree we cultivate in general, I ſhall confine myſelf particularly to our preſent method " of raiſing and managing that moſt valuable ſpecies. In the autumn after the cabbage " or turnips are eaten off, the ground will require nothing more than a common dig-" ging. So ſoon as the acorns fall, after being provided with a good quantity, we " ſow them in the following manner: Draw drills with a hoe in the ſame manner as is " practiſed for peaſe, and ſow the acorns therein ſo thick as nearly to touch each other,

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comes to good; and therefore when we ſpeak of the climate, it is to be underſtood of vallies rather than hills, and in calm places, than expoſed, becauſe they ſhoot ſtraight and upright. The reſult of all is, that upon occaſion of ſpecial timber, there is a very great and conſiderable difference; ſo as ſome oaken timber proves manifeſtly weaker, more ſpungy, and ſooner decaying than other. The like may be affirmed of Aſh, and other kinds; and, generally ſpeaking, the cloſe-grained is the ſtouteſt and moſt permanent: But of this let the induſtrious conſult that whole tenth chapter in the ſecond Book of Vitruvius, where he expreſsly treats of this argument, *de abiete ſupernate & infernate, cum Appennini deſcriptione:*

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" and leave the ſpace of one foot between row and row, and between every fifth row " leave the ſpace of two feet for the alleys. While the acorns are in the ground great " care muſt be taken to keep them from vermin, which would very often make great " havock amongſt the beds, if not timely prevented. Let this caution ſerve for moſt " other ſorts of tree-ſeeds.

" After the acorns are come up, the beds will require only to be kept clean from " weeds till they want thinning; and as the plants frequently grow more in one wet " ſeaſon, where the ſoil is tolerably good, than in two dry ones, where the ſoil is but " indifferent, the time for doing this is beſt aſcertained by obſerving when the tops of " the rows meet. Our rule is to thin them then, which we do by taking away one " row on each ſide the middlemoſt, which leaves the remaining three rows the ſame " diſtance apart as the breadth of the alleys. In taking up theſe rows we ought to " be anxiouſly careful neither to injure the roots of the plants removed, nor of thoſe " left on each ſide. The reſt of the young Oaks being now left in rows at two feet " apart, we let them again ſtand till their tops meet; then take up every other row, " and leave the reſt in rows four feet aſunder, till they arrive to the height of about " five feet, which is full as large a ſize as we ever wiſh to plant. In taking up the " two laſt ſizes, our method is to dig a trench at the end of each row full two feet " deep, then undermine the plants, and let them fall into the trench with their roots " intire.

" And here let me obſerve, that much, very much, of their future ſucceſs depends " on this point of their being well taken up. I declare that I ſhould form greater " hopes from one hundred plants well taken up and planted, than from ten times that " number taken up and planted in a random manner; beſides, the loſs of the plants " makes the worſt method the moſt expenſive.

" But before I leave this account of our method of raiſing Oaks, I ſhall juſt beg " leave to obſerve, that we are not very particular in the choice of acorns; in my own " opinion it matters not from what ſort of tree the acorns are gathered, provided they " are good; for although there ſeems to be a variety of the Engliſh Oak, in reſpect " to the form of the leaf and fruit, alſo their coming into leaf at different ſeaſons, " with ſome other marks of diſtinction, yet I am of an opinion that they will all

where we note concerning Oak, that it neither proſpers in very hot nor exceſſive cold countries; and therefore there is little good of it to be found in Africa, or, indeed, the lower and moſt ſouthern parts of Italy, (but the Venetians have excellent timber) nor in Denmark or Norway, comparable to ours, it chiefly affecting a temperate climate; and where it grows naturally in abundance, it is a promiſing mark of it. If I were

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" make good timber-trees if properly managed: It is natural to ſuppoſe that a tree " will grow low and ſpreading in a hedge-row; on the contrary, it is very improbable " that many ſhould grow ſo in a thick wood, where, in general, they draw one an- " other up ſtraight and tall. And I have obſerved that the ſame diſtinctions hold " good amongſt our large timber-trees in the woods, as in the low-ſpreading Oaks in " the hedge-rows.

" Tho' I have not as yet taken notice of any other ſort of tree but the Oak, yet we " have a great regard for, and raiſe great quantities of Beech, Larch, Spaniſh Cheſnut, " Weymouth Pine, and all ſorts of Firs, the Scotch excepted, as well as many other " kinds, by way of thickening the plantations while young; amongſt which the Birch " has hitherto been in the greateſt eſtimation, it being a quick-growing tree, and ta- " king the lead of moſt other ſorts on our poor foreſt hills; and as we have an inex- " hauſtible ſpring of them in the woods, where they riſe of themſelves in abundance " from ſeed, we at all times plant them plentifully of different ſizes. As to the Elm " and Aſh, we plant but few of them on the Foreſt, though we raiſe great quantities " of both, but particularly the Aſh, which being an uſeful wood (but a bad neighbour " amongſt the Oaks) we plant in places apart by itſelf. I ſhall diſmiſs this ſubject " concerning the management of our nurſeries, after ſaying a word or two relating to " pruning: We go over the whole of the young trees in the nurſery every winter; " but in this we do little more than ſhorten the ſtrong ſide-ſhoots, and take off one " of all ſuch as have double leads.

" Having thus pointed out the mode of forming and managing our nurſeries, I ſhall now proceed to the plantations. The ſize of the plantations, at firſt beginning, muſt " be in proportion to the ſtock of young trees in the nurſery; for to undertake to " plant more ground than we have young trees to go through with for thick planta- " tions, would turn to poor account on our Foreſt hills. We always plant thick, as " well as ſow plentifully at the ſame time, provided it be a ſeaſon in which acorns " can be had; ſo that all our plantations anſwer in a few years as nurſeries to ſuc- " ceeding plantations.

" As to the form of the plantations they are very irregular; we ſometimes follow " a chain of hills to a very great diſtance; ſo that what we plant in one ſeaſon, which " perhaps is ſixty, eighty, and ſometimes an hundred acres, is no more than a part of " one great deſign.

" If the ground intended to be planted has not already been got into order for that " purpoſe, it ſhould be fenced about at leaſt a twelvemonth before it is wanted to

Book I. to make choice of the place, or the tree, it ſhould be ſuch as grow in the beſt cow-paſture, or up-land meadow, where the mould is rich and ſweet, (Suffolk affords an admirable inſtance) and in ſuch places you may alſo tranſplant large trees with extraordinary ſucceſs: And therefore it were not amiſs to bore and ſearch the ground where you intend to plant or ſow, before you fall to work, ſince earth too ſhallow or rocky is not ſo proper for this timber; the roots fix not kindly, and though for a time they may ſeem to flouriſh, yet they will dwindle. In the mean time, it is wonderful to conſider how ſtrangely the Oak will penetrate to

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" plant on, and immediately got into order for a crop of turnips; two chaldrons of " lime being laid on an acre will be of great ſervice, as it will not only be a means of " procuring a better crop of turnips, but will bind the land afterwards, and make it " fall heavy, which is of great uſe when it comes to be planted, as ſome of the Foreſt " land is ſo exceedingly light as to be liable to be blown from the roots of the young " trees after planting: Therefore we find it to be in the beſt order for planting about " two years after it has been plowed up from paſture, before the turf is too far gone to " a ſtate of decay. It will be neceſſary to have a part of the turnips eaten off ſoon " in the autumn, in order to get the ground into readineſs for early planting; for we " find the forward planting generally ſucceeds the beſt.

" After the turnips are eaten off, we plow the ground with a double-furrow " trenching plow made for that purpoſe, which, drawn by ſix horſes, turns up the " ground completely to the depth of twelve or thirteen inches: This deep plowing is " of great ſervice to the plants at the firſt, and alſo ſaves a great deal of trouble in " making the holes. After the plowing is finiſhed, we divide the ground into quarters " for the planting by ridings. It will be a difficult matter to deſcribe the laying out " the ground for this purpoſe, eſpecially where there is ſuch a variety of land as we have " on the Foreſt; much depends on the taſte of the perſon employed in this office. " Between the hills, towards the outſides of the plantations, we frequently leave the " ridings from ſixty to an hundred yards in breadth, and contract them towards the " middle of the woods, to the breadth of ten or twelve yards; and on the tops of the " hills where there are plains, we frequently leave lawns of an acre or two, which " makes a pleaſing variety.

" In ſome of them we plant the Cedar of Libanus at good diſtances, ſo as to form " irregular groves; and this ſort of tree ſeems to thrive to admiration on the Foreſt- " land. On the outſides of the woods, next to the ridings, we plant Evergreens, as " Hollies, Laurels, Yews, Junipers, &c. and theſe we diſpoſe of in patches, ſometimes " the ſeveral ſorts entire, at other times we intermix them for variety; but not ſo as " to make a regular ſcreen or edging. Our deſign in the diſtribution of theſe plants, " is to make the outſides of the woods appear as if ſcalloped with Evergreens inter-

come to a marly bottom; ſo as where we find this tree to proſper, the indication of a fruitful and excellent ſoil is certain, even by the token of this natural Augury only; ſo as by the plantation of this tree and ſome others, we have the advantage of profit raiſed from the pregnancy, ſubſtance, and depth of our land; whilſt by the graſs and corn (whoſe roots are but a few inches deep) we have the benefit of the cruſt only.

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" mixed ſometimes with rare trees, as the *Liriondendron Tulipifera*, or Virginian " Tulip-tree, &c.

" After the ground is laid out into quarters for planting, we aſſign certain parts to " Beech, Larch, Spaniſh Cheſnuts, &c. Theſe we plant in irregular patches here and " there, throughout the plantations, which, when the trees are in leaf, has the moſt " pleaſing effect, on account of the diverſity of ſhades; eſpecially in ſuch parts of the " Foreſt where four, five, and ſometimes more of the large hill-points meet in the " ſame valley, and tend, as it were, to the ſame center.

" After thoſe patches are planted, or marked out for that purpoſe, we then proceed " to the planting in general. We always begin with planting the largeſt young trees " of every ſort, and end our work with thoſe of the ſmalleſt ſize; were we to proceed " otherwiſe, the making a hole for a larger-ſized tree, after the ſmall ones are thick " planted, would cauſe the greateſt confuſion.

" Birch is generally the ſort of tree we make our beginning with, which we find will " bear to be removed with great ſafety, at the height of ſix or ſeven feet, though we " commonly plant rather under than at that ſize. This ſort of tree we are always " ſupplied with from our plantations of five or ſix years growth. But before I proceed " to the taking them up, it will be proper to inform you, that in the planting ſeaſon " we divide our hands into four claſſes, which we term Takers-up, Pruners, Carriers, " and Planters: And here I ſhall deſcribe the ſeveral methods of doing this work.

" Firſt, in taking up we have the ſame care to take up with good roots in the plan- " tations, as was recommended in the nurſery, though we cannot purſue the ſame " method; but in both places, ſo ſoon as the plants are taken up we bed them in the " ground in the following manner: Dig a trench at leaſt fifteen inches deep, and ſet " the young trees therein with their tops aſlant, covering their roots well as we go " along, and almoſt half way up the ſtem of the plants, with the earth that comes " out of a ſecond trench, which we fill in the like manner, and ſo proceed on till we " have a load more or leſs in a heap, as may be convenient to the place from whence " they were taken. In our light ſoil this trouble is but little, and we always have our " plants ſecure, both from their roots drying, and their ſuffering by froſt. We have " a low-wheeled waggon to carry them from the heaps, where they are bedded, to the " pruners, and generally take two loads every other day. When they arrive, the " planters, pruners, &c. all aſſiſt to bed them there, in the ſame manner as before de- " ſcribed. We have a portable ſhed for the pruners to work under, which is alſo

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5. But, to diſcourage none, 'Oaks proſper exceedingly even in gravèl, and moiſt clays, which moſt other trees abhor; yea, even the coldeſt clay grounds that will hardly graze: But theſe trees will frequently make ſtands, as they encounter variety of footing, and ſometimes proceed again vigorouſly, as they either penetrate beyond, or out-grow their obſtructions, and meet better earth; which is of that conſequence, that I dare boldly affirm, more than an hundred years advance is clearly gained by ſoil and huſbandry. I have yet read, that there grow Oaks (ſome of

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" convenient for the reſt of the work people to take ſhelter under in ſtormy weather.
" From the above heaps the plants are taken only ſo faſt as they are wanted for
" pruning, which work we thus perform: Cut off all the branches cloſe to the ſtem
" to about half the height of the plant, ſhortening the reſt of the top to a conical
" form in proportion to the ſize of the plant; and in pruning of the roots, we only cut
" off the extreme parts that have been bruiſed by the taking up, or ſuch as have been
" damaged by accident, wiſhing at all times to plant with as much root as can be had.

" As ſoon as they are pruned they are taken to the planters, by the carriers, who
" are generally a ſet of boys, with ſome of the worſt of the labourers. The planters
" go in pairs; one makes the holes, and the other ſets and treads the plants faſt, which
" work they commonly do by turns. In making of the holes we always take care to
" throw out all the bad ſoil that comes from the bottom; if the planting be on the
" ſide of a hill, we lay the bad ſoil on the lower ſide of the hole, ſo as to form a kind
" of baſon; for without this care our plants would loſe the advantage of ſuch rains as
" fall haſtily. We at all times make the holes ſufficiently large, which is done with
" great eaſe after our deep plowing.

" Before we ſet the plant, we throw a few ſpadefuls of the top ſoil into the hole,
" ſetting the plant thereon with its top rather inclining to the weſt; then fill up the
" hole with the beſt top ſoil, taking care that it cloſes well with the roots, leaving no
" part hollow. When the hole is well filled up, one of the planters treads and faſtens
" the tree firmly with his feet, while his partner proceeds to make the next hole.

" The faſtening a tree well is a material article in planting; for if it once becomes
" looſe, the continual motion which the wind occaſions, is ſure to deſtroy the fibres as
" faſt as they are produced, which muſt end in the deſtruction of the plant, if not
" prevented. It is to guard againſt this inconveniency that we take off ſo much of
" the top, as has been deſcribed in the article of pruning.

" We plant about three or four hundred Birches of the large ſize on an acre, and
" nearly the ſame number of the firſt-ſized Oaks; we alſo plant here and there a
" Beech, Larch, Spaniſh Cheſnut, &c. excluſive of the patches of the ſaid ſorts of
" trees before planted. We then proceed to plant plentifully of the ſecond and leſſer-
" ſized Oaks; and laſt of all a great number of the ſmall Birches, which are procured
" from the woods at about three ſhillings or three ſhillings and ſixpence per thouſand:

which have contained ten loads apiece) out of the very walls of Silceſter in Hampſhire, which ſeem to ſtrike root in the very ſtones; and even in our renowned foreſt of Dean itſelf, ſome goodly Oaks have been noted to grow upon ground, which has been as it were a rock of antient cinders, buried there many ages ſince. It is indeed obſerved, that Oaks which grow in rough ſtony grounds, and obſtinate clays, are long before they come to any conſiderable ſtature, (for ſuch places, and all ſorts of clay, is held but a ſtep-mother to trees) but in time they afford the moſt

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" Theſe we remove to the ſucceeding plantations after the term of five or ſix years.
" Of the ſeveral ſizes of the different kinds of trees we generally plant upwards of
" two thouſand plants upon an acre of land, all in an irregular manner.

" After the planting is finiſhed we then ſow the acorns (provided it be a ſeaſon that
" they can be had) all over the plantation, except amongſt the Beech, Larch, &c. in
" the aforeſaid patches. Great care ſhould be taken to preſerve the acorns intended
" for this purpoſe, as they are very ſubject to ſprout, eſpecially ſoon after gathering;
" the beſt method is to lay them thin in a dry airy place, and give them frequent
" turnings. We ſow theſe acorns in ſhort drills of about a foot in length, which
" work is done very readily by two men, one with the acorns, the other with a hoe
" for the purpoſe of making the drills and covering the ſeed.

" We are of opinion that the plants produced from theſe acorns will at laſt make
" the beſt trees; however, I will not pretend to ſay how that may be, as the Oaks
" tranſplanted ſmall, grow equally well for a number of years: But it is probable that
" a tree with its tap-root undiſturbed may, in the end, grow to a much larger ſize.

" After the whole is finiſhed to a convenient diſtance round the pruners, we then
" remove their ſhed to a ſecond ſtation, and there proceed in the like manner; and ſo
" on till the whole be finiſhed.

" It would be well to get the planting done by the end of February, eſpecially for
" trees of the deciduous kind; but from the diſappointments we meet with, occaſioned
" by the weather, we are ſometimes detained to a later ſeaſon.

" I have ſeveral times made trial of twelve or fourteen kinds of American Oaks ſent
" over to his Grace in great quantities. I ſowed them in the nurſery, and alſo in the
" beſt and moſt ſheltered parts of the plantations. In both places they come up very
" plentifully; but I now find that ſeveral of the ſorts will not ſtand the ſeverity of our
" winters, and thoſe that do make ſo ſmall a progreſs as to promiſe no other encou-
" ragement than to be kept as curioſities.

" Towards the end of April, when the ground is moiſt, it will be of great ſervice
" to go over the whole plantations, and faſten all ſuch trees as are become looſe ſince
" their planting: After this, nothing more will be required till the month of June,
" when we again go over the whole with hoes, cutting off only the tall-growing weeds;
" for the ſooner the ground gets covered with graſs, in our light ſoil, ſo much the better.

" I own there is ſomething ſlovenly in the appearance of this method, and on ſome
" lands I would recommend keeping the ground clean hoed for ſome time at firſt,

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excellent timber, having ſtood long, and got good footing. The ſame may we affirm of the lighteſt ſand, which produces a ſmoother-grained timber, of all other the moſt uſeful for the joiner; but that which grows in gravel is ſubject to be frow, as they term it, and brittle. What improvement

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" as alſo planting in rows, which in that caſe would be neceſſary. More than once I " have tried this method on our Foreſt-hills, and always found, after every hoeing, that " the ſoil was taken away by the ſucceeding winds into the valleys.

" Beſides this inconvenience, the reflection of our ſandy ſoil is ſo very great, that " we find the plants ſtand a dry ſeaſon much better in our preſent method, than in the " former: And whoever fancies that graſs will choak and deſtroy ſeedling Oaks, will, " after a few years trial, find himſelf agreeably miſtaken: I have even recommend- " ed the ſowing the poorer parts of the hills with furze or whin-ſeed, as ſoon as they " are planted: We have ſometimes permitted the furze to grow in the plantations by " way of ſhelter for the game, which though it ſeems to choak and over-grow the " Oaks for ſome time, yet after a few years we commonly find the beſt plants in the " ſtrongeſt beds of whins. This ſhews how acceptable ſhelter is to the Oak whilſt " young; and experience ſhews us that the Oak would make but a ſlow progreſs on " the Foreſt-hills for a number of years at the firſt, were it not for ſome kind nuries; " and the Birch ſeems to anſwer that purpoſe the beſt, as I have already obſerved.

" The ſeveral ſorts of Fir-trees, from appearance, ſeem to promiſe a greater ſhelter; " but on the Foreſt-land they do not grow ſo faſt as the former, and what is worſe, " the Oak will not thrive under them, as they do immediately under the Birch.

" Where a plantation is on a plain, a ſcreen of Firs for its boundary is of ſingular " uſe, but the ſituation of the Foreſt-land denies us this advantage.

" We continue to cut down the tall-growing weeds two or three times the firſt " ſummer, and perhaps once the next, or ſecond ſeaſon after planting; which is all " that we do in reſpect to cleaning. The next winter after planting, we fill up the " places with freſh plants where they have miſcarried; after which there is little " to be done till about the fourth or fifth year; by which time the ſmall-ſized Birch, " and ſeedling Oaks, will be grown to a proper ſize for tranſplanting: In the thin- " ning of theſe due care muſt be had not to take too many away in one ſeaſon, but, " being properly managed, there will be a ſupply of plants for at leaſt half a dozen " years to come.

" About the ſame time that the leſſer-ſized Birch wants thinning, the large ones " will require to have their lower branches taken off, ſo as to keep them from injuring " the Oaks; and this is the firſt profit of our plantations, the Birch-wood being rea- " dily bought up by the broom-makers. This pruning we continue as often as re- " quired, till the Birches are grown to a ſufficient ſize to make rails for fencing; we " then cut them down to make room for their betters.

" By this time the Oaks will be grown to the height of twelve or fourteen feet, " when they draw themſelves up exceedingly faſt: Each plant ſeems as it were in a " ſtate of ſtrife with its neighbour, and in a ſtrict ſenſe they are ſo, and on no other

the ſtirring of the ground about the roots of Oaks is to the trees, I have already hinted; and yet in copſes, where they ſtand warm, and ſo thickened with under-wood as this culture cannot be practiſed, they prove in time to be goodly trees. I have of late tried the graffing of Oaks, but as yet with ſlender ſucceſs. Ruellius indeed affirms it will take the Pear and other fruit; and if we may credit the Poet,

——————— Aurea duræ
Mala ferant Quercus.——————— ECL. viii.

The ſturdy Oak does golden Apples bear.

———Glandemque ſues fregere ſub ulmis. GEORG. ii.

And greedy ſwine from grafted Elms are fed,
With falling Acorns that on Oaks are bred.

Which laſt I conceive to be the more probable; for that the ſap of the Oak is of an unkind tincture to moſt trees: but for this improvement, I

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" terms than life for life; and he whoſe fate it is to be once over-topped, is ſoon after " compelled to give up the conteſt for ever.

" After the Birches are cut down there is nothing more to be done but thinning the " Oaks, from time to time, as may be required, and cutting off their dead branches " as frequently as may be neceſſary. We are very cautious in doing the former, know- " ing well that if we can but once obtain length of timber, time will bring it into " thickneſs; therefore we let them grow very cloſe together for the firſt fifty years.

" And here it may not be improper to obſerve the progreſs the Oak makes with us, " by deſcribing them in two of our plantations, one of twenty-eight, the other of " fifty years growth. In the former they are in general about twenty-five or twenty- " ſix feet in height, and in girth about eighteen inches: The trees in the latter, " planted in 1725, are ſomething more than ſixty feet in height, and in girth a little " above three feet; and theſe trees are in general about fifty feet in the bole, from " which you will eaſily conceive the ſmallneſs of their tops, even at this age.

" It would be a difficult matter to deſcribe their farther progreſs with any degree of " certainty, therefore let it ſuffice to make this laſt obſervation on them in their mature " ſtate.

" I ſhould have before obſerved to you, that in both the aforeſaid, as well as " in all the young plantations, the Spaniſh Cheſnut keeps an equal pace, or rather " out-grows the Oak; but it is doubtful whether ever they will arrive at the ſame " ſize; for the largeſt of our Spaniſh Cheſnuts, which have much the appearance of

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would rather adviſe inoculation, as the ordinary Elm upon the Wich-Haſel, for thoſe large leaves we ſhall anon mention, and which are ſo familiar in France.

6. That the tranſplanting of young Oaks gains them ten years advance, ſome happy perſons have affirmed. From this belief, if in a former impreſſion I have deſired to be excuſed and produced my reaſons for it, I

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" old trees, do not girth more than twelve or fourteen feet, which is nothing in com-
" pariſon to ſome of our large Oaks, which girth from twenty-five to thirty feet; in-
" deed ſome of them a great deal more: For inſtance, that remarkable tree called the
" Greendale Oak, (from its growing in a valley of that name near Welbeck) which
" in the year 1724 had a hole cut through its body large enough to admit a coach to
" go thro'. This great curioſity is yet living, and frequently bears acorns, which we
" carefully ſave, to be diſtributed as preſents amongſt his Grace's acquaintance.

" I may omit deſcribing to you the preſent ſtate of this piece of antiquity, as I have
" herewith incloſed a drawing of it taken on the ſpot a few days ago *, from which
" you will ſee, notwithſtanding the uncommon ſize of the lower part of the tree, that
" it has never contained any great quantity of timber; I mean in compariſon with
" ſeveral of our largeſt Oaks, ſome of which contain, in their tower-like trunks, be-
" tween ſeven and eight hundred ſolid feet of timber, excluſive of their ſtately tops;
" and ſome of their large branches are even like trees themſelves.

" You ſee, Sir, what a ſurpriſing maſs of wood may ariſe from a ſingle acorn!
" Indeed it is really wonderful to ſee, on ſome ſoils, to what an amazing ſize this
" King of Trees will ſometimes arrive."

* See Ch. iii. Book iii.

Welbeck, June 16, 1775.

Having thus deſcribed the moſt approved methods of raiſing woods and plantations from the acorn and the nurſery, I ſhall now proceed to conſider the neceſſity of reducing them to immediate practice.

And firſt I ſhall obſerve, that the cutting down of all kinds of wood is become ſo general, that unleſs ſome effectual remedy be ſoon applied, it is more than probable that very little full-grown timber will be left in this iſland for the uſe of the ſhip-builder. The ſimple apprehenſion that this nation will, at ſome diſtant period, feel this great calamity, cannot but occaſion ſome uneaſineſs in the minds of thoſe who wiſh well to their country. But when the moſt ſerious and poſitive proofs can be produced, that, at this very moment, the royal navy is in want of that ſupply, how juſtly are our fears increaſed!—and with what zeal ought we to join in warding off the impending danger?

In the year 1763, Mr. Roger Fiſher, an eminent ſhip-builder at Liverpool, actuated by a very laudable ſpirit for the intereſt of his country, laid before the public a num-

ſhall not perſiſt againſt any ſober man's experience; and therefore leave this article to their choice, ſince, as the butcher's phraſe is, change of paſture makes fat calves; and ſo tranſplantations of theſe hard-wood trees, when young, may poſſibly, by a happy hand, in fit ſeaſon, and other circumſtances of ſoil, ſun, and room for growth, be an improvement. But as for thoſe who adviſe us to plant Oaks of too great a ſtature, they hardly make any conſiderable progreſs in an age; and therefore I cannot encourage it, unleſs the ground be extraordinarily qualified, or that the Oak you would tranſplant be not above ſix or ſeven feet growth in height; yet if any be deſirous to make trial of it, let their ſtems be of the ſmootheſt and tendereſt bark, for that is ever an indication of youth, as well as the paucity of their circles, which, in diſbranching and cutting the head off at five or ſix feet height (a thing, by the way, which the French uſually ſpare when they tranſplant this tree) may, before you ſtir their roots, ſerve for the more certain guide; and then plant them immediately, with as much earth as will adhere to them, in the place deſtined for their ſtation, abating only the tap-root *, (which is that downright and ſtubby part of the roots which all trees raiſed of ſeeds do univerſally produce) and quickening ſome

* Which yet ſome, upon good experience, will not allow in tranſplanting young Oaks; affirming the taking them up without any abatement, or the leaſt wound, does exceedingly advance the growth of this tree above ſuch as are deprived of it.

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ber of original letters written by perſons converſant in the purchaſe of ſhip-timber in almoſt every county of this kingdom. In 1771, the Hon. Auguſtus Hervey deſired theſe letters to be republiſhed, which was accordingly done; and much about the ſame time, the Editor received a ſummons to attend a committee of the houſe of commons, before whom he gave a faithful narrative of what he perſonally knew of the then ſcarcity of Oak-timber. In conſequence of his examination, and other informations exhibited by creditable dealers in wood, an act was obtained to encourage the growth of timber upon commons and waſte lands: But how far the inclinations of the people have operated with the wiſdom of the legiſlature, I am unable to determine.

As an inducement to raiſe plantations of uſeful timber, I ſhall here obſerve, that the ſhips which gave laws to the whole world in the laſt war, were conſtructed from Oaks planted ſoon after the publication of Mr. Evelyn's Silva; and I flatter myſelf that the preſent *republication* will be the means of raiſing the ſame virtuous and patriotic ſpirit. We have juſt before us a princely example: His preſent Majeſty has, with Royal Munificence, ordered a nurſery, conſiſting of twenty acres of land, to be formed upon the foreſt of Knareſbrough, to which the tenants of the crown are to have unlimited acceſs for the purpoſe of ſupplying themſelves *(gratis)* with young Oaks, and all ſorts of trees proper for the foreſt.

It is remarkable that the Oak was held ſacred by the Greeks, the Romans, the Gauls, and Britons. Among the Romans this tree was dedicated to Jupiter, as we are informed by Pliny: "Arborum genera numinibus ſuis dicata perpetuo ſervantur, ut

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of the reſt with a ſharp knife (but ſparing the fibrous, which are the main ſuckers and mouths of all trees) ſpread them in the foſs or pit which hath been prepared to receive them: I ſay in the foſs, unleſs you will rather trench the whole field, which is incomparably the beſt, and infinitely to be preferred before narrow pits and holes, as the manner is, in caſe you plant any number conſiderable, the earth being hereby made looſe, eaſier and penetrable for the roots, about which you are to caſt that mould which, in opening of the trench, you took from the ſurface, and purpoſely laid apart, becauſe it is ſweet, mellow, and better impregnated. But, in this work, be circumſpect never to enter your ſtem deeper than you found it ſtanding, for profound burying very frequently deſtroys a tree, though an error ſeldom obſerved. If, therefore, the roots be ſufficiently covered to keep the body ſteady and erect, it is enough; and the not minding of this trifling circumſtance does very much deceive our ordinary wood-men, as well as gardiners, for moſt roots covet the air, though thoſe of the Quercus Urbana leaſt of any; for, like the Eſculus,

——— Quæ quantum vertice ad auras
Ætherias, tantum radice in Tartara tendit. GEORG. ii.

High as his topmoſt boughs to heaven aſcend,
So low his roots to hell's dominion tend.

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"Jovi eſculus." By the Britons it was held in great veneration; and ſome of the moſt ſolemn ceremonies of the Druids were held under its ſacred ſhade. The ceremony of cutting the miſleto is circumſtantially deſcribed by Cæſar, Tacitus, and Pliny.

The Acorns, produced by the different ſpecies of Oaks, are ſuppoſed to have conſtituted part of the food of mankind in the early ages of the world. Lucretius, ſpeaking of the firſt age, ſays,

Glandiferas inter curabant corpora quercus
Plerumque.——————— Lib. v. l. 937.

Virgil celebrates Ceres for having firſt taught mankind how to grow corn for food.

Prima Ceres ferro mortales vertere terram
Inſtituit: cum jam glandes atque arbuta ſacræ
Deficerent ſylvæ, & victum Dodona negaret. GEORG. i. 147.

And in conſequence of this great obligation, the Roman huſbandmen, before they began their harveſt, always crowned their heads with wreaths of Oak in honour of Ceres.

——————————— Neque ante
Falcem maturis quiſquam ſupponat ariſtis,
Quam Cereri, torta redimitus tempora quercu,
Det motus incompoſitos, et carmina dicat. GEORG. i. 347.

And the perfection of that does almoſt as much concern the poſterity of a tree, as of a man himſelf, ſince *Homo* is but *Arbor inverſa*, which prompts me to this curious but important advertiſement, *that the poſition be likewiſe ſedulouſly obſerved.*

7. For the ſouthern parts of all trees being more dilated, and the pores expoſed (as evidently appears in their horizontal ſections) by the conſtant excentricity of the hyperbolical circles (ſave juſt under the equator, where the circles concentre, as we find in thoſe hard woods which grow there) ours, being now on the ſudden, and at ſuch a ſeaſon, turned to the north, does ſtarve and deſtroy more trees, how careful ſoever men have been in ordering the roots and preparing the ground, than any other accident whatſoever, neglect of ſtaking and defending from cattle excepted; the importance whereof cauſed the beſt of poets, and moſt experienced in this argument, when giving advice concerning this article, to add,

> Quin etiam cœli regionem in cortice ſignant:
> Ut, quo quæque modo ſteterit, quâ parte calores
> Auſtrinos tulerit, quæ terga obverterit axi,
> Reſtituant: adeo in teneris conſueſcere multum eſt. GEORG. ii.
>
> Beſide, to plant it as it was, they mark
> The heav'n's four quarters in the tender bark;
> And to the north or ſouth reſtore the ſide,
> Which at their birth did heat or cold abide:
> So ſtrong is cuſtom; ſuch effects can uſe
> In tender ſouls of pliant plants produce.

Which motion, though Pliny and ſome others think good to neglect, or eſteem indifferent, I can confirm from frequent loſſes of my own, and by particular trials, having ſometimes tranſplanted great trees at Midſummer with ſucceſs (the earth adhering to the roots) and miſcarried in others, where this circumſtance only was omitted.

To obſerve therefore the coaſt and ſide of the ſtock, eſpecially of fruit-trees, is not ſuch a trifle as by ſome pretended; for if the air be as much the mother or nurſe, as water and earth, as more than probable it is, ſuch bloſſoming plants as court the motion of the meridian ſun, do, as it were, evidently point out the advantage they receive from their poſition, by the

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clearneſs, politure, and comparative ſplendor of the ſouth ſide; and the frequent moſſineſs of moſt trees on the oppoſite ſide, does ſufficiently note the unkindneſs of that aſpect, moſt evident in the bark of Oaks white and ſmooth, the trees growing more kindly on the ſouth ſide of an hill than thoſe which are expoſed to the north, with an hard, dark, rougher and more moſſy integument, as I can now demonſtrate in a prodigious coat of it inveſting ſome pyracanths which I have removed to a northern dripping ſhade. I have ſeen (writes a worthy friend to me on this occaſion) whole hedge-rows of apples and pears that quite periſhed after that ſhelter was removed; the good huſbands expected the contrary, and that the fruit ſhould improve, as freed from the predations of the hedge; but uſe and cuſtom made that ſhelter neceſſary, and therefore, ſaith he, a ſtock for a time is the weaker, taken out of a thicket, if it be not well protected from all ſudden and fierce invaſions, either of crude air or winds. Nor let any be deterred, if, being to remove many trees, he ſhall eſteem it too conſumptive of time; for, with a bruſh dipped in any white colour or oaker, a thouſand may be ſpeedily marked as they ſtand; and that once done, the difficulty is over. I have been the larger upon theſe two remarks becauſe I find them ſo material, and yet ſo much neglected *.

8. There are other rules concerning the ſituation of trees; the former author commending the north-eaſt wind, both for the flouriſhing of the tree, and advantage of the timber; but, to my obſervation, they thrive the beſt in thoſe parts of our climate where thoſe ſharp winds do rather flanker than blow fully oppoſite upon our plantations; and there are as well other circumſtances to be conſidered, as they reſpect rivers, and marſhes obnoxious to unwholeſome and poiſonous fogs, hills, and ſeas, which expoſe them to the weather, and thoſe *ſilvi-fragi venti*, our cruel and tedious weſtern winds; all which I leave to obſervation, becauſe theſe accidents do ſo univerſally govern, that it is not eaſy to determine farther, than that the timber is commonly better qualified which hath endured the colder aſpects without theſe prejudices. And hence it is that Seneca obſerves, wood moſt expoſed to the winds to be the moſt ſtrong and ſolid; and that therefore Chiron made Achilles's ſpear of a mountain tree; and of thoſe the beſt, which

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* When it is judged neceſſary to tranſplant trees of a large ſize, Mr. Evelyn's advice ſeems highly to be commended, though Mr. Miller treats it as chimerical. In ſmaller trees the caution is unneceſſary.

grow thin, not much ſheltered from the north. Again, Theophraſtus ſeems to have ſpecial regard to places, exemplifying in many of Greece, which exceed others for good timber, as, doubtleſs, do our Oaks in the foreſt of Dean all others of England: And much certainly there may reaſonably be attributed to theſe advantages for the growth of timber, and of almoſt all other trees, as we daily ſee by their general improſperity, where the ground is a hot gravel, and a looſe earth. An Oak or Elm in ſuch a place, ſhall not, in an hundred years, overtake one of fifty, planted in its proper ſoil; though next to this, and, haply, before it, I prefer the good air. Thus have they ſuch vaſt Junipers in Spain; and the Aſh in ſome parts of the Levant (as of old near Troy) ſo excellent, as it was after miſtaken for Cedar, ſo great was the difference from ſituation; now the Cantabrian, or Spaniſh, exceeds any we have elſewhere in Europe. And we ſhall ſometimes, in our own country, ſee woods within a little of each other, and, to all appearance, growing on the ſame ſoil, where Oaks of twenty years growth, or forty, will, in the ſame bulk, contain their double in heart and timber; and that in one the heart will not be ſo big as a man's arm, when the trunk exceeds a man's body. This ought therefore to be weighed in the firſt plantation of copſes, and a good eye may diſcern it in the firſt ſhoot; the difference proceeding, doubtleſs, from the variety of the ſeed, and therefore great care ſhould be had of its goodneſs, and that it be gathered from the beſt ſort of trees, as was formerly hinted in the third ſection of the firſt chapter.

9. *Vetcrem arborem tranſplantare*, was ſaid of a difficult enterprize: Yet before we take leave of this paragraph, concerning the tranſplanting of great trees, let us ſhew what is poſſible to be effected in this kind, with coſt and induſtry. Count Maurice, the late governor of Braſil for the Hollanders, planted a grove near his delicious paradiſe of Friburgh, containing ſix hundred Cocoa-trees of eighty years growth, and fifty feet high to the neareſt bough; theſe he wafted upon floats and engines four long miles, and planted them ſo luckily that they bore abundantly the very firſt year, as Gaſper Barlæus hath related in his elegant deſcription of that prince's expedition. Nor hath this only ſucceeded in the Indies alone; Monſieur de Fiat, one of the Mareſchals of France, hath with huge Oaks done the like at Fiat. Shall I yet bring you nearer home? A great perſon in Devon planted Oaks as big as twelve oxen could draw, to ſupply ſome defect in an avenue to one of his houſes, as the Right Honourable

Book I. the Lord Fitz-Harding, late treaſurer of his Majeſty's houſhold, aſſured me, who had himſelf likewiſe practiſed the removing of great Oaks by a particular addreſs, extremely ingenious, and worthy the communication.

10. Chooſe a tree as big as your thigh, remove the earth from about it, cut through all the collateral roots, till, with a competent ſtrength, you can enforce it down upon one ſide, ſo as to come with your ax at the tap-root; cut that off, re-dreſs your tree, and ſo let it ſtand, covered about with the mould you looſened from it, till the next year, or longer if you think good, then take it up at a fit ſeaſon; it will likely have drawn new tender roots apt to take, and ſufficient for the tree, whereſoever you ſhall tranſplant it. Some are for laying bare the whole root, and then dividing it into four parts, in form of a croſs, to cut away the interjacent rootlings, leaving only the croſs and maſter-roots that were ſpared to ſupport the tree; then, covering the pit with freſh mould, as above, after a year or two, when it has put forth and furniſhed the interſtices you left between the croſs-roots with plenty of new fibres and tender ſhoots, you may ſafely remove the tree itſelf ſo ſoon as you have looſened and reduced the four decuſſated roots, and ſhortened the tap-roots; and this operation is done without ſtooping or bending the tree at all: And if, in removing it, you preſerve as much of the clod about the new roots as poſſible, it would be much the better.

Pliny notes it as a common thing to re-eſtabliſh huge trees which have been blown down, part of their roots torn up, and the body proſtrate; and, in particular, ſpeaks of a fir that, when it was to be trranſplanted, had a tap-root which went no leſs than eight cubits perpendicular. And to theſe I could ſuper-add, by woeful experience, where ſome Oaks and other old trees of mine tore up, with their fall and ruin, portions of earth, in which their former ſpreading roots were engaged, little leſs in bulk and height than ſome ordinary cottages and houſes built on the common: Such havock was the effect of the late prodigious hurricane. But to proceed. To facilitate the removal of ſuch monſtrous trees for the adornment of ſome particular place, or the rarity of the plant, there is this farther expedient: A little before the hardeſt froſts ſurpriſe you, make a ſquare trench about your tree, at ſuch diſtance from the ſtem as you judge ſufficient for the root; dig this of competent depth, ſo as almoſt quite to undermine it, by placing blocks and quarters of wood to ſuſtain the earth; this done, caſt in as much water as may fill the trench, or at leaſt ſufficiently wet it, unleſs the ground was very moiſt before; thus

let it ſtand till ſome very hard froſt do bind it firmly to the roots, and then convey it to the pit prepared for its new ſtation, which you may preſerve from freezing by laying ſtore of warm litter in it, and ſo cloſe the mould the better to the ſtraggling fibres, placing what you take out about your new gueſt to preſerve it in temper; but in caſe the mould about it be ſo ponderous as not to be removed by an ordinary force, you may then raiſe it with a crane or pulley, hanging between a triangle made of three ſtrong and tall limbs united at the top, where a pulley is faſtened, as the cables are to be under the quarters which bear the earth about the roots; for by this means you may weigh up, and place the whole weighty clod upon a trundle, ſledge, or other carriage, to be conveyed and replanted where you pleaſe, being let down perpendicularly into the place by the help of the foreſaid engine: And by this addreſs you may tranſplant trees of a wonderful ſtature without the leaſt diſorder, and many times without topping, or diminution of the head, which is of great importance where this is practiſed to ſupply a defect, or remove a curioſity.

11. Some adviſe that, in planting of Oaks, &c. four or five be ſuffered to ſtand very near to one another, and then to leave the moſt proſperous when they find the reſt to diſturb its growth; but I conceive it were better to plant them at ſuch diſtances as they may leaſt incommode one another: For timber-trees, I would have none nearer than forty feet where they ſtand cloſeſt, eſpecially of the ſpreading kind.

12. Laſtly, Trees of ordinary ſtature tranſplanted (being firſt well watered) muſt be ſufficiently ſtaked and buſhed about with thorns to protect them from the concuſſion of the winds, and from the caſual rubbing and poiſonous brutting of cattle and ſheep, the oilineſs of whoſe wool is alſo very noxious to them, till being well grown and fixed (which by ſeven years will be to ſome competent degree) they ſhall be able to withſtand all accidental invaſions but the ax; for I am now come to their pruning and cutting, in which work the ſeaſons are of main importance.

13. Therefore, if you would propagate trees for timber, cut not off their heads at all, nor be too buſy with lopping; but if you deſire ſhade and fuel, or bearing of maſt alone, lop off their tops, ſear, and unthriving branches only. If you intend an outright felling, expect till November; for this premature cutting down of trees before the ſap is perfectly at reſt will be to your exceeding prejudice, by reaſon of the worm, which will

Book I. certainly breed in timber which is felled before that period; but in caſe you cut only for the chimney, you need not be ſo punctual as to the time; yet, for the benefit of what you let ſtand, obſerve the moon's increaſe, if you pleaſe. The reaſon of theſe differences is, becauſe this is the beſt ſeaſon for the growth of the tree which you do not fell, the other for the durableneſs of the timber which you do; now, that which is to be burnt is not ſo material for laſting, as the growth of the tree is conſiderable for the timber; but of theſe particulars more at large in chap. iii. book iii.

14. The very ſtump of an Oak, eſpecially that part which is dry and above ground, being well grubbed, is many times worth the pains and charge for ſundry rare and hard works; and, where timber is dear, I could name ſome who, abandoning this to workmen for their pains only, when they perceived the great advantage, repented of their bargain, and undertaking it themſelves were gainers above half: I wiſh only, for the expedition of this knotty work, ſome effectual engine were deviſed, ſuch as I have been told a worthy perſonage of this nation made uſe of, by which he was able, with one man, to perform more than with twelve oxen; and ſurely there might be much done by faſtening of iron hooks and fangs about one root to extract another, the hook chained to ſome portable ſcrew or winch; I ſay ſuch an invention might effect wonders, not only for the extirpation of roots, but the proſtrating of huge trees*. That ſmall engine, which by ſome is called the German-Devil, reformed after this manner, and duly applied, might be very expedient for this purpoſe; but this is to be practiſed only where you deſign a final extirpation; for ſome have drawn ſuckers from an old ſtub root; but they certainly periſh by the moſs which invades them, and are very ſubject to grow rotten. Pliny ſpeaks of one root which took up an entire acre of ground, and Theophraſtus deſcribes the Lycean Platanus to have ſpread an hundred feet; if ſo, the argument may hold good for their growth after the tree is come to its period. They made cups of the roots of Oaks heretofore; and ſuch a curioſity Athenæus tells us was carved by Thericleus himſelf; and there is a way ſo to tinge Oak, after long burying and ſoaking in water, which gives it a wonderful politure, as that it has frequently been

NOTES.

* This wiſh is truly accompliſhed in the ERADICATOR invented by the Hon. Capt. Bentinck, and conſtructed by Mr. Cole, Engine-maker in London. The death of the ingenious inventor, at the time when the drawings were nearly compleated, has deprived this work of one of its moſt uſeful ornaments.

taken for a coarſe Ebony: Hence, even by floating, comes the Bohemian Oak, Poliſh, and other northern timber, to be of ſuch excellent uſe for ſome parts of ſhipping: But the blackneſs which we find in Oaks that have long lain under ground (and may be called ſubterranean timber) proceeds from ſome vitriolic juice of the bed in which they lie, which makes it very weighty; but, as the excellent naturaliſt and learned phyſician, Dr. Sloane, obſerves, it dries, ſplits, becomes light, and ſoon impairs.

15. There is not in nature a thing more obnoxious to deceit than the buying of trees ſtanding, upon the reputation of their appearance to the eye, unleſs the chapman be extraordinarily judicious, ſo various are their hidden and concealed infirmities till they be felled and ſawn out; ſo, as if to any thing applicable, certainly there is nothing which does more perfectly confirm it than the moſt flouriſhing outſide of trees, *fronti nulla fides*. A timber tree is a merchant adventurer,—you ſhall never know what he is worth till he be dead.

16. Oaks, in ſome places where the ſoil is eſpecially qualified, are ready to be cut for copſe in fourteen years, and ſooner; I compute from the firſt ſemination. Though it be told as an inſtance of high encouragement, (and as indeed it merits) that a Lady in Northamptonſhire ſowed acorns, and lived to cut the trees produced from them twice in two-and-twenty years, and both as well grown as moſt are in ſixteen or eighteen. This yet is certain, that acorns ſet in hedge-rows have, in thirty years, borne a ſtem of a foot diameter. Generally, copſe-wood ſhould be cut cloſe, and at ſuch intervals as the growth requires, which, being ſeldom conſtant, depends much on the places and the kinds, the mould and the air; and for which there are extant particular ſtatutes to direct us; of all which more at large hereafter. Oak for tan-bark may be felled from April to the laſt of June, by a ſtatute in 1 Jacobi; and here are ſome for the diſbarking of Oaks, and ſo to let them ſtand before they fell.

USES.

17. To enumerate now the incomparable uſes of Oak were needleſs; but ſo precious was the eſteem of it, that of old there was an expreſs law amongſt the twelve tables concerning the very gathering of the acorns, tho' they ſhould be found fallen in another man's ground. The land and the ſea do ſufficiently ſpeak for the improvement of this excellent material; houſes and ſhips, cities and navies are built with it, and there is a kind

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of it ſo tough, and extreamly compact, that our ſharpeſt tools will hardly enter it, and ſcarcely the very fire itſelf, in which it conſumes but ſlowly, as ſeeming to partake of a ferruginous and metalline ſhining nature, proper for ſundry robuſt uſes. It is doubtleſs, of all timber hitherto known, the moſt univerſally uſeful and ſtrong; for though ſome trees be harder, as Box, Cornus, Ebony, and divers of the Indian woods, yet we find them more fragil, and not ſo well qualified to ſupport great incumbencies and weights; nor is there any timber more laſting, which way ſoever uſed. There has, we know, been no little ſtir amongſt learned men, of what material the croſs was made on which our bleſſed Saviour ſuffered: Venerable Bede, in Collectaneis, affirm it to have been framed of ſeveral woods, namely, Cypreſs, Cedar, Pine, and Box; and to confirm it, St. Hierom has cited Iſaiah lx. 13. *Gloria Libani ad te veniet, & Buxus & Pinus ſimul ad ornandum locum ſanctificationis meæ, & locum pedum meorum ſignificabo*; but, following the verſion of the LXX, he reads, *in Cupreſſo, Pinu, & Cedro, &c.* Others inſert the Palm, and ſo compoſe the croſs of no leſs than four different timbers, according to the old verſe:

Quatuor ex lignis Domini crux dicitur eſſe.
Pes crucis eſt Cedrus, corpus tenet alta Cupreſſus;
Palma manus retinet, Titulo lætatur Oliva.

Nail'd were his feet to Cedar, to Palm his hands,
Cypreſs his body bore, Title on Olive ſtands:

And for this of the Palm, they fetch it from that of Cant. vii. 8. where it is ſaid, *Aſcendam in Palmam, & apprehendam fructus ejus* *, and from other allegorical and myſterious expreſſions of the ſacred text without any manner of probability; whilſt by Alphonſus Ciacconius, Lipſius, Angelus Rocca, Falconius, and divers other learned men, writing on this ſubject, and upon accurate examination of the many fragments pretended to be parcels of it, it is generally concluded to have been the Oak; and I do verily believe it, ſince thoſe who have deſcribed thoſe countries aſſure us there is no tree more frequent, which, with relation to ſeveral celebrations and myſteries under Oaks in the Old Teſtament, has been the ſubject of many fine diſcourſes. Nor is it likely they ſhould chooſe or aſſemble ſo many ſorts of

NOTES.

* The Septuagint has it more properly, "Aſcendam in palmam, tenebo *cacumina* ejus."

woods, with that curioſity, to execute one upon whom they eſteemed a malefactor; beſides, we read how heavy it was, which Cypreſs, Cedar, and Palm are not in compariſon with Oak; whilſt Gretſer denies all this, lib. i. cap. vi. and concludes, upon his accurate examination of ſeveral fragments yet extant, that it is not diſcernible of what timber it was framed. We might add to theſe the furious zeal of the bloody and malicious Jews, to ſee our bleſſed Lord inhumanly executed, could not poſſibly allow leiſure to frame a croſs of ſo many rare and curious materials: Let this therefore paſs for an errant legend*.

That which is twined and a little wreathed (eaſily to be diſcerned by the texture of the bark) is beſt to ſupport burthens, for poſts, columns, ſummers, &c. for all which our Engliſh Oak is infinitely preferable to the French, which is nothing ſo uſeful, nor comparably ſo ſtrong: inſomuch as I have frequently admired at the ſudden failing of moſt goodly timber to the eye, which, being employed to theſe uſes, does many times moſt dangerouſly fly in ſunder, as wanting that native ſpring and toughneſs which our Engliſh Oak is endued withal. And here we forget not the ſtreſs which Sir H. Wotton, and other architects, put even in the very poſition of their growth, their native ſtraitneſs and loftineſs for columns, ſupporters, croſs-beams, &c. and 'tis found that the rough-grained body of a ſtubbed Oak is the fitteſt timber for the caſe of a cyder-mill, and ſuch like engines, as beſt enduring the unquietneſs of a ponderous rolling-ſtone. It is good for ſhingles, pales, laths, cooper's ware, clap-board for wainſcot (the ancient *inteſtina opera* †—works within doors) and ſome pannels curiouſly veined, of much eſteem in former times, till the finer-grained Spaniſh and Norway timber came amongſt us, which is likewiſe of a whiter colour. There is in New-England a certain red Oak which, being felled, they ſeaſon in ſome moiſt and muddy place, which branches into very curious works. It is obſerved that Oak will not eaſily glue to other wood, nor very well with its own kind; and ſome woods will never cohere tolerably, as the Box and Hornbeam, though both very hard; ſo, nor Service with Cornell, &c. Oak is excellent for wheel ſpokes, pins, and

† And therefore were joiners called Inteſtinarii. See Leg. ii. Cod. Theodoſ.

NOTES.

* The whole of this ſeems an unneceſſary digreſſion. A ſuperſtitious Monk might be allowed to waſte his time in inveſtigations of this nature; but a ſerious and practical Chriſtian, in the humility of his ſoul, will deſpiſe ſuch ridiculous fooleries, and content himſelf with the bare truth of the hiſtorical fact, as recorded in the books of the New Teſtament.

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pegs for tyling, &c. Mr. Blith makes ſpars and ſmall building timber of Oaks of eleven years growth, which is a prodigious advance. The ſmalleſt and ſtraighteſt is beſt, diſcovered by the upright tenor of the bark, as being the moſt proper for cleaving; the knottieſt for water-works, piles, and the like, becauſe it will drive beſt and laſt longeſt; the crooked, yet firm, for knee-timber in ſhipping, mill wheels, &c*. In a word, how abſolutely neceſſary the Oak is above all the trees of the foreſt in naval architecture, &c. conſult Whitſon, lib. i. cap. xiii.

Were planting of this wood more in uſe, we ſhould baniſh our hoops of hazel, &c. for thoſe of good Copſe-Oak, which, being made of the younger ſhoots, are exceeding tough and ſtrong; one of them, being of Ground-Oak, will out-laſt ſix of the beſt aſh; but this our coopers love not to hear of, who work by the great for ſale, and for others. The ſmaller truncheons and ſpray make billet, bavine, and coals; and the bark is of price with the tanner and dyer, to whom the very ſaw-duſt is of uſe, as are the aſhes and lee for bucking linen, and to cure the ropiſhneſs of wine: And as it is probable the cups of our acorns would tan leather as well as the bark, I wonder no body makes the experiment, as done in Turkey with the Valonia, which is a kind of acorn growing on the Oaks. The Ground-Oak, while young, is uſed for poles, cudgels, and walking-ſtaffs, much come into mode of late, but to the waſte of many a hopeful plant which might have proved good timber; and I the rather declaim againſt the cuſtom, becauſe I ſuſpect they are ſuch as are for the moſt part cut and ſtolen by idle perſons, and brought up to London in great bundles, without the knowledge or leave of the owners, who would never have gleaned their copſes for ſuch trifling uſes. Here I am again to give a general notice of the peculiar excellency of the roots of moſt trees, for fair, beautiful, chamleted, and laſting timber, applicable to many purpoſes; ſuch as formerly made hafts for daggers, hangers, knives, handles for ſtaves, tobacco-boxes, and elegant joiners' work, and even for ſome mathematical inſtruments of the larger ſize, to be had either in or near the roots of many trees; however, 'tis a kindneſs to

NOTES.

* Every perſon who can meaſure timber thinks himſelf qualified to value ſtanding trees; but ſuch men are often deceived in their eſtimates. It is the perfect knowledge of the application of the different ſhaped trees that enables a man to be correct in his valuation. A foot of wood may be of little value to one trade, but of great value to another. This is the grand ſecret which enriches the purchaſers of ſtanding timber.

premoniſh ſtewards and ſurveyors, that they do not negligently waſte thoſe materials: Nor may we here omit to mention tables for painters, which heretofore were uſed by the moſt famous artiſts, eſpecially the curious pieces of Raphael, Durer, and Holbein, and before that of canvaſs, and much more laſting: To theſe add the galls, miſleto, polypod, agaric, uſed in antidotes, uvæ, funguſes to make tinder, and many other uſeful excreſcences, to the number of above twenty, which doubtleſs diſcover the variety of tranſudations, percolations, and contextures of this admirable tree; but of the ſeveral fruits and animals generated of them, and other trees, Franciſco Redi promiſes an expreſs treatiſe in his *Eſperienze intorno alla Generatione de gl' Inſetti*, already publiſhed. Pliny affirms, that the galls break out all together in one night, about the beginning of June, and arrive to their full growth in one day; this I ſhould recommend to the experience of ſome extraordinary vigilant wood-man, had we any of our Oaks that produced them, Italy and Spain being the neareſt that do. Galls are of ſeveral kinds, but grow upon a different ſpecies of Robur from any of ours, which are never known to bring theſe excreſcences to maturity; the white and imperforated are the beſt; of all which, and their ſeveral ſpecies, ſee Jaſp. Bauhinus, and the excellent Malpighius, in his Diſcourſe de Gallis, and other morbous tumours raiſed by, and producing inſects, infecting the leaves, ſtalks, and branches of this tree with a venomous liquor or froth, wherein they lay and depoſite their eggs, which bore and perforate theſe excreſcences when the worms are hatched, ſo as we ſee them in galls.

What benefit the maſt does univerſally yield, once in two years at leaſt, for the fatting of hogs and deer, I ſhall ſhew upon another occaſion before the concluſion of this diſcourſe. A peck of Acorns a day, with a little bran, will make a hog, 'tis ſaid, increaſe a pound weight per diem for two months together. They give them alſo to oxen, mingled with bran, chopped or broken; otherwiſe they are apt to ſprout and grow in their bellies *. Others ſay they ſhould firſt be macerated in water to extract their malignity, cattle many times periſhing without this prepara-

NOTES.

* The food taken in by ruminant animals does not remain long enough in the ſtomach and inteſtinal canal to occaſion the germination of acorns, maſt, or any kind of ſeed. And if ſuch a luxuriancy of vegetation ſhould take place, ſtill no bad conſequence could poſſibly ariſe from it.

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tion. Cato adviſes the huſbandman to reſerve two hundred and forty buſhels of acorns for his oxen, mingled with a like quantity of beans and lupines, and to drench them well. But, in truth, they are more proper for ſwine, and, being ſo made ſmall, will fatten pigeons, peacocks, turkeys, pheaſants, and poultry; nay, it is reported that ſome fiſhes feed on them, eſpecially the tunny, in ſuch places of the coaſt where trees hang over arms of the ſea. Acorns, before the uſe of wheat-corn was found out, were heretofore the food of men, nay, of Jupiter himſelf, as well as other productions of the earth, till their luxurious palates were debauched: And even in the time of the Romans, the cuſtom was, in Spain, to make a ſecond ſervice of acorns and maſt, as the French now do of marrons and cheſnuts, which they likewiſe uſed to roaſt under the embers:

——————— & quernâ glande repaſta
Equaſſe annoſas vivendo corpora quercus.

——————— Fed with the oaken maſt,
The aged trees themſelves in years ſurpaſs'd.

And men had indeed hearts of Oak; I mean, not ſo hard, but health and ſtrength, and lived naturally, and with things eaſily parable and plain:

Fælix illa ætas mundi, juſtiſſima Nymphe,
Cum dabat umbra domum vivam tua, cùm domus ipſa
Deciduâ dominos paſcebat fruge quietos,
Soláque præbebant ſylveſtria poma ſecundas
Gramineis epulas menſis; nondum arte magiſtra
Arbor adulteriis præluſerat inſita noſtris. COULEII Pl. l. vi.

Bleſt age o' th' world, juſt Nymph, when man did dwell
Under thy ſhade whence his proviſion fell;
Sallads the meal, wildings were the deſert;
No tree yet learn'd, by ill example, art,
With inſititious fruit, to ſymbolize,
As in an emblem, our adulteries.

Thus the ſweet Poet beſpeaks the Dryad; and therefore it was not called Quercus, as ſome etymologiſts fancied, becauſe the Pagans (*quærebantur reſponſa*) had their oracles under it, but becauſe they ſought for acorns:

But it is in another place * where I ſhew you what this acorn was. And even now I am told, that thoſe ſmall young acorns which we find in the ſtock-doves craws are a delicious fare, as well as thoſe incomparable ſallads, young herbs taken out of the maws of partridges at a certain ſeaſon of the year, which gives them a preparation far exceeding all the art of cookery. Oaks bear alſo a knur, full of a cottony matter, of which they anciently made wick for their lamps and candles; and among the *Selectiora Remedia* of *Jo. Prævotius*, there is mention of an oil *è querna glande* chemically extracted, which he affirms to be of the longeſt continuance, and leaſt conſumptive of any other whatſoever for ſuch lights, *ita ut uncia ſingulis menſibus vix abſumatur continuo igne.* The ingenious author of the Deſcription of the Weſtern Iſles of Scotland tells us, that, upon his own experience, a rod of Oak, of four, five, ſix, or eight inches about, being twiſted like a wyth, boiled in wort, well dried, and kept in a little bundle of barley-ſtraw, and then ſteeped again in wort, cauſes it to ferment, and procures yeaſt. The rod ſhould be cut before mid-day, and is frequently uſed in this manner to furniſh yeaſt, and, being preſerved, will ſerve, and produce the ſame effect many years together; and, as the hiſtorian affirms, that he was ſhewed a piece of thick wyth which had been kept for making ale with for above twenty years †. In the mean time, the leaves of Oaks abundantly congeſted on ſnow, preſerve it as well for wine as a deep pit, or the moſt artificial refrigeratory. Nor muſt we paſs by the ſweet meldews, ſo much more copiouſly found on this tree than any other, whence the induſtrious bees gather ſuch abundance of honey, as that, inſtead of carrying it to their hives, they glut themſelves to death: But, from this ill report, haſtily taken up by Euricius Cordus, our learned Mr. Ray has vindicated this temperate and abſtemious uſeful creature. Varro affirms they made ſalt of Oak aſhes, with which they ſometimes ſeaſoned meat, but more frequently made uſe of it to ſprinkle among, and fertilize their ſeed-corn; which minds me of a certain Oak, found buried ſomewhere in Tranſylvania near the ſalt-pits, that was entirely converted into an hard ſalt when they came to examine it by cutting. This experiment, if true, may poſſibly encourage ſome other attempts for the multiplying of ſalt. Nor leſs ſtrange is that which ſome report of a certain water,

* Chap. i. Book iv.

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† Yeaſt retains, from a variety of experiments, the power of communicating a ferment for many months. In the above caſe it inſinuates itſelf between the fibres of the wood, which cloſe upon it, and only give it to the wort when warmed and moiſtened.

Book I. ſomewhere in Hungary, which tranſmutes the leaves of this tree into braſs, and iron into copper*. Of the galls is made trial of ſpaw-water, and the ground and baſis of ſeveral dies, eſpecially ſadder colours, and are a great revenue to thoſe who have quantities of them. Nor muſt I forget ink, compoſed of galls ℥iiij, copperas ℥ij, gum arabic ℥i; beat the galls groſsly, and put them into a quart of claret or French wine, and let them ſoak for eight or nine days, ſetting the veſſel (an earthen glazed pitcher is beſt) in the hot ſun, if in ſummer, but in winter near the fire, ſtirring it frequently with a wooden ſpatula; then add the copperas and gum; and after it has ſtood a day or two it will be fit to uſe. There are a world of receipts more, of which ſee Caneparius *de Atramentis*. Of the very moſs of the Oak, that which is white compoſes the choiceſt cypreſs-powder, which is eſteemed good for the head; but impoſtors familiarly vend other moſſes under that name, as they do the fungi (excellent in hæmorrhages and fluxes) for the true agaric, to the great ſcandal of Phyſic. Young red oaken leaves, decocted in wine, make an excellent gargle for a ſore mouth; and almoſt every part of this tree is ſovereign againſt fluxes in general, and where aſtringents are proper. The dew that impearls the leaves in May, inſolated, meteorizes, and ſends up a liquor which is of admirable effect in ruptures. The liquor iſſuing out between the bark, which looks like treacle, has many ſovereign virtues. And ſome affirm the water ſtagnate in the hollow ſtump of a newly felled Oak is as effectual as *lignum ſanctum* in the foul diſeaſe, and alſo ſtops a diarrhæa. And a water diſtilled from the acorns is good againſt the pthiſick, ſtitch in the ſide, and heals inward ulcers, breaks the ſtone, and refrigerates inflammations, being applied with linen dipt therein: Nay, the acorns themſelves, eaten faſting, kill the worms, provoke urine, and, ſome affirm, break even the ſtone itſelf. The coals of Oak, beaten and mingled with honey, cure the carbuncle. We ſhall ſay nothing of the viſcuſes, polypods, and other excreſcences, of which innumerable remedies are

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* Braſs is a factitious metal, and never diſcovered in a natural ſtate; ſo that what Mr. Evelyn here ſays muſt be regarded as fabulous. With reſpect to what he mentions of iron being converted into copper, there is the appearance of truth in the experiment. In Ireland there is a ſpring, into which, if plates of iron are laid, they will be converted, in a few weeks, into copper: But in this caſe there is a fallacy, and no real tranſmutation. The particles of iron are corroded by the acid in the water, and the particles of the copper, minutely ſuſpended in the menſtruum, are depoſited in their place. In this manner conſiderable quantities of copper are collected.

compoſed, noble antidotes, ſyrups, &c. Nay, it is reported that the very ſhade of this tree is ſo wholeſome, that the ſleeping, or lying under it, becomes a preſent remedy to paralyticks, and recovers thoſe whom the miſtaken malign influence of the Walnut-tree has ſmitten †. But what is ſtill more ſtrange, I read in one Paulus, a phyſician of Denmark, that a handful or two of ſmall Oak buttons, mingled with oats, given to horſes which are black of colour, will, in a few days eating, alter it to a fine dapple grey, which he attributes to the vitriol abounding in this tree *.

To conclude, upon ſerious meditation of the various uſes of this and other trees, we cannot but take notice of the admirable mechaniſm of vegetables in general, as in particular in this ſpecies, that, by the diverſity of percolations, and ſtrainers, and by mixtures, as it were of divine chemiſtry, various concoctions, &c. the ſap ſhould be ſo green on the indented leaves, ſo luſtily eſculent, for hardier and ruſtic conſtitutions, in the fruit; ſo flat and pallid in the atramental galls; and, haply, ſo prognoſtic in the apple; ſo ſuberous in the bark (for even the Cork-tree is but a coarſer Oak); ſo ouzie in the tanner's pit; and, in that ſubduction, ſo wonderfully ſpecific in corroborating the entrails and bladder, reins, loins, back, &c. which are all but the gifts and qualities, with many more, that theſe robuſt ſons of the earth afford us; and that, in other ſpecifics, even the moſt deſpicable and vulgar Elder imparts to us in its rind, leaves, buds, bloſſoms, berries, ears, pith, bark, &c. which hint may alſo carry our remarks upon all the varieties of ſhape, leaf, ſeed, fruit, timber, grain, colour, and all thoſe other forms that philoſophers have enumerated; but which were here too many for us to repeat.

NOTES.

† The anticnts, who were fond of refreſhing themſelves under the ſhade of trees, caution us againſt the influence of the Walnut. Pliny ſays of its ſhade, "gravis et "noxia, etiam capiti humano, omnibuſque juxta ſatis." Lib. xvii. c. xviii.

* The wood contains no vitriol; neither can the fact, relative to change of colour, be true. The medicinal virtues here enumerated are not to be depended on, excepting in caſes where aſtringents are indicated.

CHAP. IV.

The ELM. *

BOOK I. 1. ULMUS, the Elm. Of this there are four or five ſorts, and, from the difference of the ſoil and air, divers ſpurious: Two of theſe kinds are moſt worth your culture, viz. the Vulgar, or Mountain Elm, which is taken to be the Oriptelea of Theophraſtus, being of a leſs jagged and ſmaller leaf; and the Vernacula, or French Elm, whoſe leaves are thicker, and more florid, glabrous, and ſmooth, delighting in the lower and moiſter grounds, where they will ſometimes riſe to above an hundred feet in height, and a prodigious growth, in leſs than an age; myſelf having ſeen one planted by the hand of a Counteſs, living not long ſince, which was near twelve feet in compaſs, and of an height proportionable, notwithſtanding the numerous progeny which grew under the ſhade of it, ſome whereof were at leaſt a foot in diameter, that, for want of being ſeaſonably tranſplanted, muſt needs have hindered the procerity of their ample and indulgent mother: I am perſuaded ſome of theſe were *Vivira-dices & Traduces*, produced of the falling ſeeds.

2. For though both theſe ſorts are raiſed of appendices or ſuckers, as anon we ſhall deſcribe, yet this latter comes well from the *ſamera*, or ſeeds, and therefore I ſuppoſe it to be the ancient *Atinia*; for ſuch an Elm

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* The Elm is the next tree which offers itſelf to our obſervation; and it deſerves this place, whether we conſider its beauty when growing, or its uſefulneſs when felled. Of the Elm there are ſix kinds enumerated by Mr. Miller.

1. ULMUS *(Campeſtris)* foliis oblongis acuminatis, duplicato-ſerratis, baſi inæqualibus. *Elm with oblong acute-pointed leaves, which are doubly ſawed on their edges, and unequal at their baſe.* Ulmus vulgatiſſima, folio lato, ſcabro. Ger. Emac. 1480. *The common rough, or broad-leaved Wych Elm.*

This ſort is very common in the north-weſt counties of England, where it grows to a very large ſize, and is generally believed to grow naturally in the woods. The bark of the young branches is ſmooth and very tough, but that of the old trees cracks and is rough. The branches ſpread, and do not grow ſo thick as thoſe of the third ſort. The leaves are rough, and are doubly ſawed on their edges. Their [illegible] unequal, about three inches long and two broad, of a dark green colour, and ſtand upon ſhort foot-ſtalks. The flowers come out in March upon

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The common Elm tree.

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they acknowledge to be raiſed of ſeeds, which, being ripe about the beginning of March, though frequently not till the following month, will produce them; as we might have ſeen abundantly in the gardens of the Thuilleries, and that of Luxemberg, at Paris, where they uſually ſow themſelves, and come up very thick; and ſo do they in many places of our country, though ſeldom taken notice of, as that it is eſteemed a fable by the leſs obſervant and ignorant vulgar: Let it therefore be tried in ſeaſon, by turning and raking ſome fine earth, often refreſhed, under ſome amply ſpreading tree; or to raiſe them of their ſeeds, being well

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the ſlender twigs, ſtanding in cluſters; they are of a deep red colour; theſe are ſucceeded by oval bordered capſules, containing one roundiſh compreſſed ſeed, which ripens in May. The wood of this tree is good for all the purpoſes of any kind of Elm; but the leaves do not come out till late in the ſpring, ſo there are few perſons who plant theſe trees near their habitations.

2. ULMUS *(Scabra)* foliis oblongo-ovatis inæqualitur ſerratis, calycibus foliaceis. *Elm with oblong oval leaves which are unequally ſawed, and have leafy empalements to the flowers.* Ulmus folio latiſſimo, ſcabro. Ger. Emac. 1481. *The Wych Hazel, or rough and very broad-leaved Elm*; by ſome unſkilful perſons called the *Britiſh Elm.*

This ſort grows naturally in ſome of the northern counties of England, where it is frequently called Wych Hazel, from the reſemblance of the young ſhoots and leaves to thoſe of Hazel. It grows to a tree of great magnitude. The bark of the young ſhoots is very ſmooth and tough; it is of a yellowiſh brown colour, with ſpots of white. The leaves are oval, ſix inches long, and almoſt four broad, and are unequally ſawed on their edges. The flowers grow in cluſters toward the end of the twigs; they have long leafy empalements of a green colour, and appear in the ſpring before their leaves, and the ſeeds ripen the latter end of May. The wood of this tree is not ſo good for uſe as that of the firſt ſort. Formerly, when long bows were in uſe, many of them were made of the boughs of this tree.

3. ULMUS *(Sativa)* foliis ovatis acuminatis duplicato-ſerratis, baſi inæqualibus. *Elm with oval acute-pointed leaves which are doubly ſawed, and unequal at their baſe.* Ulmus minor, folio anguſto, ſcabro. Ger. Emac. 1480. *The ſmall-leaved or Engliſh Elm.*

This kind is commonly known in the nurſery-gardens by the title of Engliſh Elm, which is far from being a right appellation; for it is not a native of England, and is only found growing near London, or in plantations where the young trees were procured from the neighbourhood of London. Where this tree grows naturally, is not eaſy to determine; ſome perſons have ſuppoſed it was brought from Germany. As it is well known, it requires no deſcription. The flowers are of

Book I. dried a day or two before, ſprinkled on beds prepared of good loamy freſh earth, and ſifting ſome of the fineſt mould thinly over them, and watering them when need requires: Being riſen, which may be within four or five months, an inch above ground, refreſhed and preſerved from the ſcraping of birds and poultry, comfort the tender ſeedlings by a ſecond ſifting of more fine earth to eſtabliſh them; thus keep them clean weeded for the firſt two years, cleanſing the ſide boughs; or, till being of fitting ſtature to remove into a nurſery at wider intervals and even rows, you may thin and tranſplant them in the ſame manner as you were directed for your young Oaks, only they ſhall not need above one cutting,

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a purpliſh red colour, and generally appear the beginning of March; but I could never obſerve any ſeeds upon this ſort.

4. Ulmus *(Glabra)* foliis ovatis glabris, acutè ſerratis. *Elm with oval ſmooth leaves which are ſharply ſawed on their edges.* Ulmus folio glabro. Ger. Emac. 1481. *The ſmooth-leaved Wych Elm.*

This is very common in ſeveral parts of Hertfordſhire, Eſſex, and other north-eaſt counties of England, where it grows to a large tree, and is much eſteemed. The branches ſpread out like thoſe of the firſt ſort. The leaves are oval, and ſharply ſawed on their edges; they are ſmoother than moſt of the other ſorts, and do not appear till the middle or latter end of May, ſo that this kind is ſeldom planted near habitations.

5. Ulmus *(Hollandica)* foliis ovatis acuminatis rugoſis, inæqualiter ſerratis, cortice fungoſo. *Elm with oval, acute-pointed, rough leaves, which are unequally ſawed, and a fungous bark.* Ulmus major Hollandica, anguſtis & magis acuminatis ſameris, folio latiſſimo, ſcabro. Pluk. Alm. *The Dutch Elm.*

This ſort is well known by the title of Dutch Elm; it was brought from Holland the beginning of King William's reign, and was for ſome time a faſhionable tree, and has been recommended for its quick growth; it was ſome years ago in great requeſt for forming hedges in gardens, for which purpoſe it was one of the moſt improper trees that could be choſen, on account of its making very ſtrong irregular ſhoots diſtant from each other. The leaves being very large and rough, and the branches covered with a fungous rough bark, the hedges, when ſheared, appeared naked and diſagreeable the whole ſummer after. The wood of this tree is good for nothing, ſo it is almoſt baniſhed this country.

6. Ulmus *(Minor)* foliis oblongo-ovatis glabris acuminatis duplicato-ſerratis. *Elm with oblong, ſmooth, acute-pointed leaves, which are doubly ſawed.* Ulmus minor, folio anguſto, glabro. *The ſmooth narrow-leaved Elm, by ſome called the upright Elm.*

This is found growing in hedge-rows in ſeveral parts of England. The branches have a ſmooth grayiſh bark, and grow erect. The leaves are narrower, and

where they grow leſs regular and hopeful. But, becauſe this is an experiment of ſome curioſity, obnoxious to many caſualties, and that the producing them from the mother-roots of greater trees is very facile and expeditious, beſides the numbers which are to be found in the hedge-rows and woods, of all plantable ſizes, I rather adviſe our foreſter to furniſh himſelf from thoſe places.

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more pointed than thoſe of the Engliſh Elm, and are ſmoother; they are later in coming out in the ſpring than thoſe, but continue longer in autumn: It has been by ſome called the Iriſh Elm.

Of the Elm there are ſome other varieties which are preſerved in the nurſery-gardens; but their difference is not remarkable enough to deſerve notice, therefore they are omitted, as are alſo thoſe with variegated leaves, of which there are ſeveral ſorts propagated in the nurſeries about London.

The Elm is ſtationed in the claſs and order *Pentandria Digynia*, there being in each flower five ſtamina and two ſtyles. The flowers are in full bloom about the beginning of April, and the leaves open about the middle of the ſame month, but the ſeeds are not ripe before the beginning of June.

Elms are propagated by layers, by ſeeds, and by grafting on their own kind.

In order to propagate them by layers, proper ſtools for the purpoſe muſt be firſt obtained; to procure which, let a piece of good ground be double dug, and let Elms of about four or five feet high be planted in it, at the diſtance of about ten feet: If they make good ſhoots in the firſt year, they may be cut down early the ſpring following; if not, they ſhould remain two years before they are headed for ſtools, which ſhould be done by cutting them down to within half a foot of the ground. After they are cut down, they ſhould be ſuffered to grow undiſturbed for two years: The ground between the ſtools muſt be dug in the winter, and conſtantly hoed as the weeds ariſe in the ſummer; and at the end of that time, that is two years, the branches growing from theſe ſtools will be fit for layering, which may be performed thus: Excavate a piece of ground wide enough to receive a whole branch, and let the hollow be about half a foot deep; then ſplaſh the branch with a knife, near the body of the ſtool, that its head may be more readily brought into the prepared place: Next, thruſt an hooked ſtick into the ground to hold it down; take off all the ſuperfluous branches which croſs, and would otherwiſe incommode thoſe that are to be continued: After this, ſlit all the remaining young branches half way through, turning the edge of the knife towards the extremity of the branch. When this is done the mould ſhould be gently put amongſt them, and they ſhould all have their ends bent towards the ſtool, that the ſlit may be kept open. Laſtly, having the whole vacuity filled with its own mould, ſmooth and even, take off the end of each twig that peeps above the ground, down to one eye; and the branch, thus laid, will afford as many plants as there are buds peeping out of

BOOK I.

3. The ſuckers which I ſpeak of are produced in abundance from the roots, whence, being dextrouſly ſeparated, after the earth has been well looſened, and planted about the end of October, they will grow very well; nay, the ſtubs only, which are left in the ground after a felling, being fenced in as far as the roots extend, will furniſh you with plenty, which may be tranſplanted, from the firſt year or two, ſucceſſively, by

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the ground. Proceed in like manner to the other branches of the ſame ſtool, then to the next ſtool in order, and ſo on until the whole buſineſs of layering be finiſhed.

By the autumn following, theſe layers will have taken root, and many of them will have made a ſhoot of near a yard in length. It is then neceſſary to take them from their ſtools, and plant them in ſome double-dug ground in the nurſery. They ſhould be ſet in rows three feet aſunder, and the diſtance allowed them from each other in the rows ought to be a foot and an half. Here they may ſtand till they are planted out where they are to remain, with no farther trouble than digging the ground between the rows every winter, and, in the ſummer, carefully watching thoſe which ſhoot out two branches at the head, and nipping the weakeſt of them off.

After the layers are taken up, the ſtools muſt have all the wounded parts, occaſioned by the former ſplaſhing, taken away; the old branches alſo ſhould be cut off pretty cloſe to the ſtem, and in the ſpring they will begin to ſhoot out freſh branches again for a ſecond layering, which will likewiſe be ready to have the ſame operation performed the ſecond year after: And thus may this layering be performed on theſe ſtools every other year. But nurſerymen, who would raiſe great quantities of trees this way, ſhould be provided with two quarters of ſtools, to come in alternately, ſo that from one or other of them they may annually receive a crop.

Another, and by far the moſt expeditious method of raiſing Elms, is by ſowing the ſeeds; but this practice chiefly reſpects the Wych Elm, the ſeeds of the others very rarely ripening in this country. In order, therefore, to obtain a good quantity of theſe Elms, let the ſeeds be gathered the beginning of June, it being the time when they are full ripe. When gathered, ſpread them three or four days to dry; for, if they were to be ſown immediately after they were gathered, they would rot. Having been ſpread about that time, and the ground, which ought to be freſh and good, being in readineſs for their reception, mark out your beds four feet wide, and let the alleys between them be a foot and an half or two feet broad. Rake the mould out of the beds until they are about an inch deep; riddle that which came out of the beds into them again, until the bottom of each bed be raiſed half an inch (*i. e.* half filled) with riddled mould; then gently preſs the mould down with the back of the ſpade, and ſow the ſeeds thinly all over it with an even hand, covering them down with fine earth about half an inch deep. When the ſeeds are all ſown this way, the beds ſhould be hooped and covered with mats, to ſhade the plants during the hot ſeaſon; and they ſhould alſo ſometimes be refreſhed with water: Part of the young plants will come up in about a month, or ſooner; the others not till the ſpring following. From

ſlipping them from the roots, which will continually ſupply you for many years, after that the body of the mother-tree has been cut down: And from hence probably is ſprung that (I fear) miſtake of Salmaſius and others, where they write of the growing of their chips (I ſuppoſe having ſome of the bark on) ſcattered in hewing of their timber; the error pro-

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the time the ſeeds are ſown to their appearance above ground, whenever rain falls, be careful to uncover the beds, and be as ready to cover them again when the ſcorching beams of the ſun break out. About the end of Auguſt, the mats ſhould be wholly taken away, that the plants may be hardened againſt winter: The ſpring following, a freſh breed will preſent themſelves among thoſe that came up the ſummer before: All the ſummer following they ſhould be conſtantly kept free from weeds, and watered as often as dry weather ſhall render it neceſſary; and in October, or ſpring, they may be planted out in the nurſery, at the diſtance before preſcribed for the layers, and afterwards ſhould be managed like them.

Grafting is the next method of propagating Elms, all the ſorts of which may be encreaſed this way: The ſtocks for the purpoſe ſhould be the broad-leaved Wych Elm, which muſt be raiſed from the ſeed, and planted out as before. When they have grown two years in the nurſery they will be of proper ſize to receive the graft; the beginning of March is the beſt time for the work. If a large quantity of Elm ſtocks are to be grafted, procure ſix men in readineſs for the purpoſe: The buſineſs of the firſt man is to take the mould from the ſtem of the ſtocks, with a ſpade, down to the root, laying the top of the root bare; the next man is to follow him with a ſharp pruning-knife, cutting off the heads of the ſtocks, and leaving the ſtumps to be grafted only about two inches above the root; the third man is the grafter himſelf, who, having his grafts cut about four or five inches in length, all of the young wood, and ſuch as have never bore lateral branches, in a diſh, takes out one of them, and, holding it in his left hand, the taper end being from him, with the knife that is in his right, he takes off a ſlope about an inch and an half, or two inches long; and, if the grafter be an artiſt, it will be cut as true as if wrought by a plane: This done, he forms a tongue by making a ſmall ſlit upwards, beginning from the top of the ſlope, and then proceeds to prepare the ſtock to receive it, which is effected by ſloping off a ſide of it, of the ſame length with the ſloped graft, that the parts may fit as near as poſſible: He then makes a cut, nearly at the top of the ſtock, downward, to receive the tongue he had made in the graft; and, having properly joined them, he proceeds to the next. After the grafter, follows a perſon with baſs matting, cut into proper lengths; and, with theſe, he ties the grafts pretty cloſe to the ſtock. The fifth man brings the clay, which ſhould have been prepared a week, or longer, before, and well worked and beaten over, mixed with a fourth part of horſe-dung, and ſome chopped hay, in order to make it hang the better together; with this he ſurrounds the graft and the ſtock. Laſtly, the ſixth man comes and cloſes the clay, ſo that there may be no probability of its being waſhed off. Two or three

Book I. ceeding from this, that, after an Elm-tree has been felled, the numerous ſuckers, which ſhoot from the remainders of the latent roots, ſeem to be produced from this diſperſion of the chips: Let this yet be more accurately examined; for I pronounce nothing magiſterially, ſince it is ſo confidently reported.

4. I have known ſtakes, ſharpened at the ends for other purpoſes, take root familiarly in moiſt grounds, and become trees; and divers have eſſay-

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rows being grafted, let an additional hand or two be employed, either in drawing the earth up above the clay, ſo that it may be wholly covered, or digging the ground between the rows, and levelling it ſo, that nothing of the performed work may appear, except the tops of the grafts, above ground. The danger of froſt renders this precaution highly neceſſary; for, if it ſhould be delayed a night or two, and ſharp froſts ſhould happen, the clay will, moſt of it, fall off; and thus the work will require to be repeated; whereas, when it is lapped warm in the manner directed, there will be no danger of ſuch an accident.

A good workman, with the above-mentioned neceſſary aſſiſtance, will graft about a thouſand ſtocks in a day. In the ſpring, the buds will ſwell, diſcloſe, and ſhoot forth nearly as ſoon as thoſe of the tree from which they were taken. By the latter end of June they will be ſhot a foot, or about a foot and a half; when they ſhould be freed from the clay; the matting ſhould be alſo taken off, and themſelves left to ſport at eaſe with all the vegetative powers. At this time, of thoſe which have put forth two ſhoots, the weakeſt ſhould be taken off, to ſtrengthen the other, and to lighten the head, which would otherwiſe be ſubject to be broken off by high winds. By autumn the ſhoot will have grown about a yard in length; and, in the winter, the ground ſhould be dug between the rows.

The trees, thus grafted, may remain in the nurſery till they are of a ſize to be planted out for continuance, with no other trouble than what was directed for the layers; namely, keeping them clear of weeds, digging between the rows in the winter; at the ſame time taking off all very large ſide-branches; and, in the ſummer, pinching off ſuch young ſhoots, in the head, as may have a tendency to make the tree become forked.

This practice of grafting will be found a valuable improvement of the Engliſh Elm, if we conſider the nature of the Wych Elm, on which it is grafted. Firſt, the Wych Elm will not only grow to the largeſt ſize of all the ſorts, but will grow the faſteſt. However, this is not to be wondered at, if we examine the root, which we ſhall find more fibrous, and the pores larger, and in greater number than in any of the other Elms. Now, as all roots are of a ſpongy nature, to receive the juices of the earth for the nouriſhment and growth of the tree, that tree muſt neceſſarily grow the faſteſt whoſe root is moſt ſpongy and porous; and therefore the true Engliſh Elm, being ſet upon the root of the Wych, a greater quantity of nutriment is received from the earth for its increaſe, in proportion as the root of the Wych Elm is more ſpongy and porous

ed, with extraordinary ſucceſs, the truncheons of the boughs and arms of Elms, cut to the ſcantling of a man's arm, about an ell in length: Theſe muſt be chopped on each ſide oppoſite, then laid into trenches about half a foot deep, and covered about two or three fingers deep with good mould. The ſeaſon for this work is towards the exit of January, or early in February, if the froſts impede not; and, after the firſt year, you may cut or ſaw-

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than that of its own ſort. Thus the Engliſh Elm, on this baſis, will arrive at timber many years ſooner than thoſe raiſed by layers, and be alſo forced to a greater ſize.

All kinds of Elms, the Wych excepted, are proper to plant in hedge-rows, upon the borders of fields, where they will thrive much better than when planted in a wood, or cloſe plantation, and their ſhade will not be very injurious to whatever grows under them; but when theſe trees are tranſplanted out upon banks after this manner, the banks ſhould be well wrought, and cleared from all other roots, otherwiſe the plants, being taken from a better ſoil, will not make much progreſs in theſe places. Michaelmas will be a good time for this work; but when they are planted, there ſhould be ſome ſtakes fixed in by them, to which they ſhould be faſtened to prevent their being diſplaced by the winds, and part of their heads ſhould be taken off before they are planted, which will alſo be of uſe in preventing their being eaſily overturned by winds; but by no means ſhould their leading ſhoot be ſtopped, nor the branches too cloſely cut off; for if there are not ſome ſhoots left on to draw and attract the ſap, they will be in danger of miſcarrying.

Theſe trees are alſo proper to plant at a diſtance from a garden, or building, to break the violence of winds, for which purpoſe there is not any tree more uſeful; for they may be trained up in form of a hedge, keeping them cut every year, which will cauſe them to grow very cloſe and handſome to the height of forty or fifty feet, and be a great protection againſt the fury of winds; but they ſhould not be planted too near a garden, where fruit-trees or other plants are placed, becauſe the roots of the Elms run ſuperficially upon the ground to a great diſtance, and will intermix with the roots of other trees, and deprive them of nouriſhment; nor ſhould they be planted near gravel or graſs walks, which are deſigned to be well kept, becauſe the roots will run into them, and ſend forth ſuckers in great plenty, which will deface the walks, and render them unſightly. It muſt however be conſidered, that by grafting the Engliſh Elm upon the Wych ſtock, the inconveniences from the ſpreading of the roots will be removed.

The Elm may be removed when grown to a conſiderable ſize; ſo that a perſon who is willing to have his plantations for ſhade in a ſhort time, may procure trees of near one foot circumference in their trunk, which will be in little danger of miſcarrying, provided they are removed with care: And theſe will take root, and grow very well, though not ſo well as young plants, which is what few other ſorts of trees will do; but then they ſhould be ſuch trees as have been thus regularly trained up in a nurſery, and have good roots, and not ſuch as are taken out of hedge-rows, (as is by ſome practiſed) which ſeldom riſe with any tolerable roots, and conſequently often miſcarry;

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the truncheons off in as many places as you find cauſe, and as the ſhoots and rooted ſprouts will direct you for tranſplantation. Another expedient for the propagation of Elms is this: Let trenches be ſunk at a good diſtance, viz. twenty or thirty yards from ſuch trees as ſtand in hedge-rows, and in ſuch order as you deſire your Elms ſhould grow: Where theſe gutters are, many young Elms will ſpring from the ſmall roots of the ad-

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and this has been the occaſion of ſo many plantations of theſe trees failing; for altho' ſome of them may live a few years, yet few of them are of long duration, and they rarely increaſe much in their ſtems; but frequently grow hollow, their heart decaying firſt, ſo that they are ſupported only by their bark or ſhell, for a few years, and the firſt ſevere winter, or very dry ſummer, they are generally deſtroyed.

Although I have ſaid that Elms, which are trained up in a nurſery, may be removed with ſafety, at a larger ſize than moſt other trees, yet I would not have it underſtood, that by this I would recommend the planting of them when large; for if people would have a little patience when they plant, and never plant any of theſe trees which are more than four or five inches in the girt of the ſtem, they would, in a few years, have better trees than if they had put down ſuch as were of a larger ſize; beſides, ſmall trees are much more eaſily removed, and do not require to be ſo ſtrongly ſupported, nor is there much danger of their miſcarrying; therefore it is much more eligible to make choice of young thriving trees, and never to plant any large ones, unleſs where a ſmall number may be wanted for an immediate ſhade.

In planting of Elms, great care muſt be taken not to bury their roots too deep, which is very injurious to them, eſpecially if they are planted on a moiſt loam or clay; in which caſe, if the clay be near the ſurface, it will be the beſt way to raiſe the ground in a hill, where each tree is to be planted, which will advance their roots above the ſurface of the ground, ſo that they will not be in danger of rotting in winter with moiſture.

When theſe trees are propagated by ſuckers taken from the foot of old trees, they are commonly laid into the ground in rows pretty cloſe together in beds, where, in dry weather, they may be frequently watered to encourage their putting out roots. In theſe beds they are left commonly two years, by which time thoſe that live will be rooted (though a great many of them generally die); they then are tranſplanted into the nurſery, and managed as hath been directed for layers: But this method is not to be commended.

The Wych Elm is by no means proper to plant in hedge-rows or open fields, as it will throw out monſtrous large arms, and thereby appear not ſo beautiful as the Engliſh Elm: Few of theſe therefore ſhould be planted, unleſs it be to make a contraſt with the others. This tree, however, is very proper to be planted for woods; for, being near each other, they will aſpire like the Oak; no great arms will be produced, but a clear noble trunk will preſent itſelf to a great height.

Whoever is deſirous of having an *Ulmarium*, or wood of theſe Elms, muſt raiſe the plants in the ſeminary, as before directed, and afterwards plant them in the

joining trees. Divide, after one year, the ſhoots from their mother-roots, which you may dextrouſly do with a ſharp ſpade, and theſe, tranſplanted, will prove good trees without any damage to their progenitors. Or do thus: Lop a young Elm, the lop being about three years growth; do it in the latter end of March, when the ſap begins to creep up into the boughs, and the buds are ready to break out; cut the boughs into lengths of four feet ſlanting, leaving the knot where the bud ſeems to put forth in the middle: Inter theſe ſhort pieces in trenches of three or four inches deep, and in good mould well troden, and they will infallibly produce you a crop; for even the ſmalleſt ſuckers of Elms will grow, being ſet when the ſap is newly ſtirring in them. There is yet a fourth way, no leſs expeditious, and frequently confirmed with excellent ſucceſs: Bare ſome of the maſter-roots of a vigorous tree within a foot of the trunk, or thereabouts, and with your ax make ſeveral chops, putting a ſmall ſtone into every cleft to hinder the cloſure, and give acceſs to the wet;

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nurſery. The rows need not be wider than two feet, nor the plants above a foot aſunder, if ground is ſcarce, as they muſt be ſoon taken from hence to form the wood: When they are about three or four feet high, they will be of a proper ſize for this purpoſe. The ground ſhould be prepared ready for their reception, which I would adviſe to have done by double digging; but, if this ſhould be thought too expenſive, and the plantation is deſigned to be very large, let it be plowed all over very deep with a very-ſtrong plow, that the turf, or rich ſoil at the ſurface, may be work'd down in order to receive the roots of the plants when they ſtrike, and ſend them forth with more vigour. This being done, make the holes all over the ground; and, as theſe trees are not ſo large as thoſe planted for ſtandards, they need not be ſo wide; a foot and a half will be ſufficient; and if there be any turf, ſee that it is chopt ſmall at the bottom of them. If the beſt mould, deſigned to lap the roots in, is not very pliable or fine, it will be proper to let the holes lie open ſome time, and the mould be expoſed to the ſun, rain, and froſt, which will greatly mellow it, and render it more fit for the purpoſe. The diſtance of theſe holes ſhould be two yards. Having taken the trees out of the nurſery, cut off all large lateral branches, and ſhorten the other ſide-ſhoots in proportion to the root; and, having alſo taken off all the bruiſed parts of the roots, proceed to plant them. After this, they will require no farther care till their branches begin to touch one another; when they ſhould be thinned, by taking away every ſecond, or rather the leſs-thriving trees, all over the plantation. Thus they may continue until the branches meet again, when they ſhould undergo a ſecond thinning, grubbing up always the old roots, and ſo on, to the pleaſure and profit of the owner, till the trees are arrived at maturity, when they will be noble, lofty, and valuable.

Columella, in his twelfth chapter *de Arboribus*, informs us, 'that Elms were principally employed in making living props to vines; and that vineyards, formed upon this

Book I. then cover them with three or four inches of earth, and thus they will ſend forth ſuckers in abundance; I aſſure you, one ſingle Elm, thus well ordered, is a fair nurſery, which, after two or three years, you may ſeparate and plant in the *Ulmarium*, or place deſigned for them; and which, if it be in plumps, as they call them, within ten or twelve feet of each other, or in hedge-rows, it will be better; for the Elm is a tree of conſort, ſociable, and ſo affecting to grow in company, that the very beſt which I have ever ſeen do almoſt touch one another: This alſo protects them from the winds, and cauſes them to ſhoot of an extraordinary height, ſo as, in little more than forty years, they arrive to a load of timber, provided they be ſedulouſly and carefully cultivated, and the ſoil propitious; for an Elm does not thrive ſo well in the foreſt, as where it may enjoy ſcope for the roots to dilate and ſpread at the ſides, as in hedge-rows and avenues, where they have the air likewiſe free. Note, that they ſpring abundantly by layers alſo.

5. There is, beſides theſe ſorts we have named, one of a more ſcabrous harſh leaf, but very large, which becomes an huge tree, (frequent in the northern counties) and is diſtinguiſhed by the name of the Wich-Haſle in our Satute Books, as ſerving formerly to make long bows of: The timber is not ſo good as the firſt more vulgar; but the bark, at a proper ſeaſon of the year, will ſerve to make coarſe baſt-rope.

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extenſive plan, were named *Arbuſta*, the vines themſelves being called *Arbuſtivæ Vites*, to diſtinguiſh them from others raiſed in more confined ſituations. Since the introduction of ſilk-worms into Italy, the Mulberry trees, in many places, are pollarded for the double purpoſe of ſupporting vines, and ſupplying leaves for feeding the worms. Once in two years the Elms were carefully pruned, to preſerve their leaves from overſhadowing the grapes; and this operation was deemed of great importance: Corydon is reproached for a double neglect, in ſuffering both his Elms and Vines to remain unpruned:

Semiputata tibi frondoſa vitis in ulmo eſt. Ecl. ii. 70.

Virgil, in his elegant deſcription of the implements of huſbandry, recommends the *buris*, or plow-tail, to be made of an Elm bent in the woods:

Continuo in ſilvis magna vi flexa domatur
In burim, et curvi formam accipit Ulmus aratri. Geor. i. 170.

Among the ancients, it was cuſtomary to plant about their tombs ſuch trees as bore no ſeeds, particularly the Elm:

Jove's Silvan daughters bade their Elms beſtow
A barren ſhade, and in his honour grow.

POPE'S HOMER, vi. 530.

6. Of all the trees which grow in our woods, there is none which does better ſuffer the tranſplantation than the Elm; for you may remove a tree of twenty years growth with undoubted ſucceſs: It is an experiment I have made in a tree almoſt as big as my waiſt; but then you muſt totally diſbranch him, leaving only the ſummit entire; and, being careful to take him up with as much earth as you can, refreſh him with abundance of water. This is an excellent and expeditious way for great perſons to plant the acceſſes of their houſes with; for, being diſpoſed at ſixteen or eighteen feet interval, they will, in a few years, bear goodly heads, and thrive to admiration. Some that are very cautious, emplaſter the wounds of ſuch over-grown Elms with a mixture of clay and horſe dung, bound about them with a wiſp of hay or fine moſs; and I do not reprove it, provided they take care to temper it well, ſo as the vermin neſtle not in it. But, for more ordinary plantations, younger trees, which have their bark ſmooth and tender, clear of wenns and tuberous bunches, (for thoſe of that ſort ſeldom come to be ſtately trees) about the ſcantling of your leg, and their heads trimmed at five or ſix feet height, are to be preferred before all other. Cato would have none of theſe ſorts of trees to be removed till they are five or ſix fingers in diameter; others think they cannot take them too young; but experience, the beſt miſtreſs, tells us, that you can hardly plant an Elm too big*. There are who pare away the root within two fingers of the ſtem, and quite cut off the head; but I cannot commend this extreme ſeverity, no more than I do the ſtrewing of oats in the pit; which, fermenting with the moiſture and frequent waterings, is believed much to accelerate the putting forth of the roots; not conſidering that, for want of air, they corrupt and grow muſty, which more frequently ſuffocates the roots, and endangers the whole tree.

7. I have affirmed how patient this tree is of tranſplantation; not only for that I obſerve ſo few of them to grow wild in England, and where it

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* It ſeems to have been thought an excellence amongſt the Roman huſbandmen to be able to tranſplant large trees. Virgil repreſents the old Corycian as poſſeſſed of that knowledge in a high degree:

Ille etiam ſeras in verſum diſtulit *Ulmos*,
Eduramque pirum, & ſpinos jam pruna ferentes,
Jamque miniſtrantem platanum potantibus umbras. GEORG. iv. 144.

In theſe verſes, it is remarkable that the poet has beſtowed upon the trees ſuch epithets as prove them to have been of conſiderable ſtature.

Book I. may not be ſuſpected but they or their predeceſſors have been planted by ſome induſtrious hand; but for that thoſe incomparable walks and viſtas of them, both at Aranjuez, Caſal del Campo, Madrid, the Eſcurial, and other places of delight, belonging to the King and Grandees of Spain, are planted with ſuch as, they report, Philip the ſecond cauſed to be brought out of England; before which, as that moſt honourable perſon, the Earl of Sandwich, when his Majeſty's Ambaſſador Extraordinary at that court, writ to me, it does not appear there were any of thoſe trees in all Spain. But, of that plantation, ſee it more particularly deſcribed in chapter VII. book III. of this diſcourſe, whither I refer my reader; whilſt, as to my own inclination, I know of no tree amongſt all the foreſters, becoming the almoſt interminat Lontananza of walks and viſtas, comparable to this majeſtic plant.

8. The Elm delights in a ſound, ſweet, and fertile land, ſomething more inclined to loamy moiſture, and where good paſture is produced; though it will alſo proſper in the gravelly, provided there be a competent depth of mould, and be refreſhed with ſprings; in defect of which, being planted on the very ſurface of the ground, the ſwarth pared firſt away, and the earth ſtirred a foot deep or more, they will undoubtedly ſucceed; but, in this trial, let the roots be handſomely ſpread, and covered a foot or more in height, and, above all, firmly ſtaked. This is practicable alſo for other trees, where the ſoil is over moiſt or unkind; for, as the Elm does not thrive in too dry, ſandy, or hot grounds, no more will it abide the cold and ſpungy; but in places that are competently fertile, or a little elevated from theſe annoyances, as we ſee in the mounds and caſting up of ditches, upon whoſe banks the female ſort does more naturally delight, though it ſeems to be ſo much more addicted to ſome places than to others, that I have frequently doubted whether it be a pure indigene* or tranſlatitious; and not only becauſe I have hardly ever known any conſiderable woods of them, (beſides ſome few nurſeries near Cambridge planted, I ſuppoſe, for ſtore) but almoſt continually in tufts, hedge-rows, and mounds; and that Shropſhire, and ſeveral other counties, and rarely any beyond Stamford to Durham, have any growing in many miles together. In the mean time, ſome affirm they were firſt

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* The Elm is certainly an indigenous tree, of which there can be no ſtronger proof than that there are near forty places in this kingdom which have their names from it, moſt of which are mentioned in Doomſday-book.

brought out of Lombardy, where indeed I have obſerved very goodly trees about the rich grounds, with Pines among them; for I hear of none either in Saxony or Denmark, nor in France, growing wild, who all came and preyed upon us after the Romans. But I leave this to the learned.

9. The Elm is, by reaſon of its aſpiring and tapering growth, unleſs it be topped to enlarge the branches and make them ſpread low, the leaſt offenſive to corn and paſture-grounds; to both which, and the cattle, they afford a benign ſhade, defence, and agreeable ornament; but then, as to paſtures, the wandering roots, (apt to infect the fields and graſs with innumerable ſuckers) and the leading mother-root, ought to be quite ſeparated on that part, and the ſuckers eradicated: The like ſhould be done where they are placed near walks of turf or gravel.

10. It ſhould be planted as ſhallow as may be; for, as we noted, deep interring of roots is amongſt the catholic miſtakes, and this the greateſt to which trees are obnoxious. Let new-planted Elms be kept moiſt by frequent refreſhings upon ſome half-rotten fern, or litter, laid about the foot of the ſtem, the earth being a little ſtirred and depreſſed for the better reception and retention of the water.

11. Laſtly, your plantations muſt, above all things, be carefully preſerved from cattle, and the concuſſions of impetuous winds, till they are out of reach of the one, and ſturdy enough to encounter the other.

12. When you lop the ſide-boughs of an Elm, (which may be about January, for the fire, and, more frequently, if you deſire to have them tall, or that you would form them into hedges, for ſo they may be kept plaſhed, and thickened to the higheſt twig, affording both a magnificent and auguſt defence againſt the winds and ſun) I ſay, when you trim them, be careful to indulge the tops, for they protect the body of your trees from the wet, which always invades thoſe parts firſt, and will, in time, periſh them to the very heart; ſo as Elms, beginning thus to decay, are not long proſperous. Sir Hugh Platt relates, as from an expert Carpenter, that the boughs and branches of an Elm ſhould be left a foot long, next the trunk, when they are lopped; but this is, to my certain obſervation, a very great miſtake, either in the relator or author; for I have noted of many Elms, ſo diſbranched, that the remaining ſtubs grew

Book I. immediately hollow, and were as ſo many conduits or pipes, to hold, and convey the rain to the very body and heart of the tree.

13. There was a cloyſter of the right French Elm in the little garden near to her Majeſty's, the Queen-mother's, chapel at Somerſet-houſe, which were, I ſuppoſe, planted there by the induſtry of the F. F. Capuchines, that would have directed you to the incomparable uſe of this noble tree, for ſhade and delight, into whatever figure you will acuſtom them. I have myſelf procured ſome of them from Paris, but they were ſo abuſed in the tranſportation, that they all periſhed, ſave one which now flouriſhes with me: I have alſo lately graffed Elms, to a great improvement of their heads. Virgil tells us they will join in marriage with the Oak*, and they would both be tried; and the ſucceſs for ſuch lignous kinds will be the more probable, if you graff under the earth, upon or near the very root itſelf, which is likely to entertain the cyon better than when more expoſed, till it be well fixt, and have made ſome conſiderable progreſs.

14. When you would fell, let the ſap be perfectly in repoſe, as it is commonly about November or December, even to February, after the froſt hath well nipped them: I have already alledged my reaſon for it; and I am told, that, both Oak and Elm ſo cut, the very ſaplings, whereof rafters, ſpars, &c. are made, will continue as long as the very heart of the tree, without decay. In this work, cut your kerfe near to the ground, but have a care that the tree ſuffers not in the fall, and be ruined with its own weight: This depends upon your wood-man's judgment in diſbranching, and is a neceſſary caution to the felling of all other timber-trees. If any begin to doat, pick out ſuch for the ax, and rather truſt to its ſucceſſor; and, ſhould you cut over late, by floating them two or three months in the water, it prevents the worm, and proves the beſt of ſeaſons.

15. Elm is a timber of moſt ſingular uſe, eſpecially where it may lie continually dry or wet, in extreams; therefore proper for water-works, mills, the ladles and ſoles of the wheel, pipes, pumps, aquæducts, pales, ſhip-planks beneath the water-line; and ſome that have been found buried

NOTES.

* Virgil is very animated in his idea of engrafting an Oak upon an Elm. He repreſents the acorns as the fruit of the marriage; and the ſwine cracking them under the tree: "Glandemque ſues fregere ſub Ulmis."

in bogs, have turned like the moſt poliſhed and hardeſt ebony, only diſcerned by the grain; alſo for wheel-wrights, handles for the ſingle hand-ſaw, &c. rails and gates made of Elm, thin ſawed, are not ſo apt to rive as Oak; the knotty for naves, hubs; the ſtraight and ſmooth for axle-trees; and the very roots for curiouſly dappled works; it ſcarce has any ſuperior for kerbs of coppers, featheridge, and weather-boards, (but it does not, without difficulty, admit the nail without boring) chopping blocks, blocks for the hat-maker, trunks and boxes to be covered with leather, coffins, dreſſers and ſhovel-board tables of great length, and a luſtrous colour if rightly ſeaſoned; alſo for the Carver, by reaſon of the tenor of the grain, and toughneſs; which fits it for all thoſe curious works of frutages, foliage, ſhields, ſtatues, and moſt of the ornaments appertaining to the orders of architecture, and for not being much ſubject to warping. I find that, of old, they uſed it even for hinges and hooks of doors; but then, that part of the plank which grew towards the top of the tree, was, in work, to be always reverſed; and for that it is not ſo ſubject to rift, Vitruvius commends it both for tenons and mortaiſes: But, beſides theſe, and ſundry other employments, it makes alſo a ſecond ſort of charcoal; and, finally, which I muſt not omit, the uſe of the very leaves of this tree, eſpecially of the female, is not to be deſpiſed; for, being ſuffered to dry in the ſun upon the branches, and the ſpray ſtripped off about the decreaſe in Auguſt, as alſo where the ſuckers are ſupernumerary and hinder the thriving of their nurſes, they will prove a great relief to cattle, in winter and ſcorching ſummers, when hay and fodder is dear; they will eat them before oats, and thrive exceedingly well with them; remember only to lay your boughs up in ſome dry and ſweet corner of your barn.—It was for this the poet praiſed them, and the epithet was adviſed:

Fœcundæ frondibus Ulmi. VIRG.

Fruitful in leaves the Elm.

In ſome parts of Herefordſhire they gather them in ſacks for their ſwine and other cattle, according to this huſbandry*. But I hear an ill report of this tree for bees, that, ſurfeiting of the blooming ſeeds, they are

NOTES.

* The Roman huſbandmen fed their cattle with the leaves of Elm. Columella, ſpeaking of this practice, ſays, "Eſt autem Ulmus longe lætior et procerior, quam "noſtras, frondemque jucundiorem bubus præbet: qua cum aſſidue pecus alueris, et "poſtea generis alterius frondem dare inſtitueris, faſtidium bubus affert."

BOOK I. obnoxious to the laſk * at their firſt going abroad in ſpring, which endangers whole ſtocks, if remedies be not timely adhibited; therefore, 'tis ſaid, in great Elm countries they do not thrive; but the truth of which I am yet to learn. The green leaf of the Elm, contuſed, heals a green wound or cut, and, boiled with the bark, conſolidates fractured bones. All the parts of this tree are abſterſive, and therefore ſovereign for the conſolidating wounds; they aſſuage the pains of the gout; and the bark,

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* Virgil gives a moſt beautiful deſcription of this malady, ſo fatal to his favourite bees:

But when, as human ills deſcend to bees,
The pining nation labours with diſeaſe;
Chang'd is their glittering hue to ghaſtly pale,
Roughneſs and leanneſs o'er their limbs prevail;
Forth the dead citizens with grief are borne,
In ſolemn ſtate the ſad attendants mourn.
Clung by the feet they hang the live-long day
Around the door, or in their chambers ſtay;
Hunger and cold, and grief, their toils delay.
'Tis then in hoarſer tones their hums reſound,
Like hollow winds the ruſtling foreſt round,
Or billows breaking on a diſtant ſhore;
Or flames in furnaces that inly roar.
Galbanean odours here I ſhall adviſe;
And thro' a reed to pour the ſweet ſupplies
Of golden honey, to invite the taſte
Of the ſick nation, to their known repaſt:
Bruis'd galls, dry'd roſes, thyme, and centaury join,
And raiſins ripen'd on the Pſithian vine.
Beſides, in meads the plant Amellus grows,
And from one root thick ſtalks profuſely throws,
Which eaſily the wand'ring ſimpler knows:
Its top a flower of golden hue diſplays,
Its leaves are edg'd with violet-tinctur'd rays;
Rough is the taſte; round many an holy ſhrine
The ſacred prieſts its beauteous foliage twine:
This, where meand'ring Mella laves the plains,
Or in the new-ſhorn valley, ſeek the ſwains;
Its roots infuſe in wine, and at their door
In baſkets hang the medicated ſtore. WARTON.

decocted in common water, to almoſt the conſiſtence of a ſyrup, adding a third part of aqua-vitæ, is a moſt admirable remedy for the iſchiadica, or hip-pain, the place being well rubbed and chafed by the fire. For other wonderful cures performed by the liquor, &c. of this tree, ſee Mr. Ray's Hiſtory of Plants, lib. xxv. cap. i. ſect. 5. And for other ſpecies of the Elm, conſult his Supplement.

CHAP. V.

The BEECH *.

Book I. 1. FAGUS, the Beech. I rank this tree before the martial Ash, because it commonly grows to a greater ſtature. It is of two or three kinds, and is numbered among the glandiferous trees. But here I may not omit a note of the accurate critic Palmerius, upon a paſſage in Theophraſtus, where he animadverts upon his interpreter, and ſhews that the ancient Φηγὸς was by no means the Beech, but a kind of Oak; for that the figure of the fruit is ſo widely unlike it, that being round, this triangular: And both Theophraſtus and Pauſanias make it indeed a ſpecies of Oak, as already we have noted in chap. iii. wholly differing in trunk, as well as fruit and leaf; to which he adds, (what determines the controverſy) ξύλον τῆς φηγῆ ἰσχυρόταλον καὶ ἀσηπέςαλον; that it is of a firmer timber, not obnoxious to the worm; neither of which can ſo confidently

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* The Beech is a beautiful as well as a valuable tree. The leaves are of a pleaſant green, and many of them remain on the branches during the winter, when they preſent themſelves of a brown colour; for which reaſon this tree is proper to ſhelter habitations, and ſuch places as require to be ſcreened from violent winds. It may be planted either in woods or open fields, in both which ſtations it grows to a conſiderable height, and carries with it a proportionable trunk. In hedge-rows and the borders of fields it expands its branches to an amazing extent.——Of this genus there are three ſpecies.

1. FAGUS *(Sylvatica)* foliis ovatis obſoleté ſerratis. Flor. Suec. 785. Sp. Plant. 1416. Fagus. Ger. Em. 1444. Bauh. Pin. 419.

This is the common Beech, of which the buds begin to open about the fifteenth of April, and the leaves come out about the twenty-firſt. The flowers ſhew themſelves about the twelfth of May, and by the fourth of June they are in full bloom. Theſe are ſucceeded by the maſt, an angular fruit, which is ripe in the autumn.

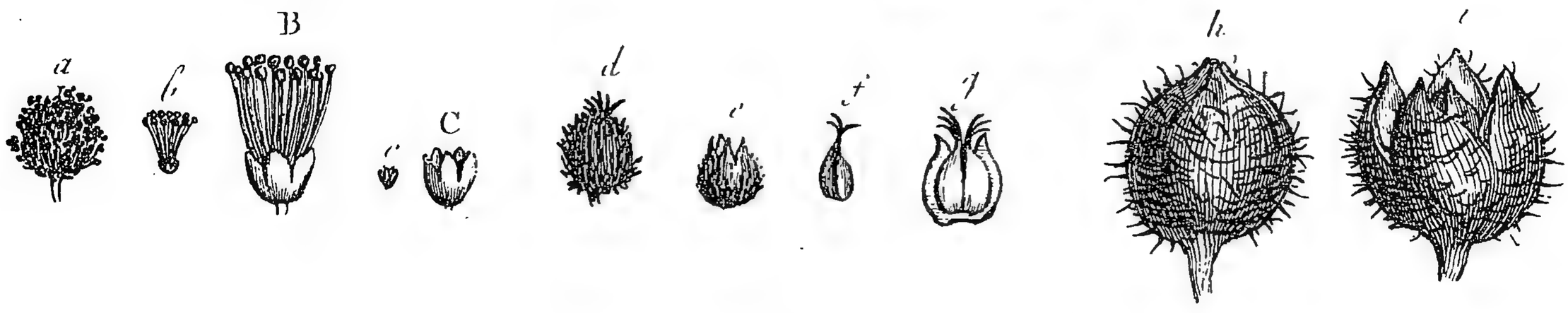
2. FAGUS *(Caſtanea)* foliis lanceolatis acuminato-ſerratis ſubtus nudis. Hort. Cliff. 447. Caſtanea Sativa. Bauh. Pin. 418.

This is the Spaniſh Cheſnut which is particularly deſcribed in ch. viii.

3. FAGUS *(Pumila)* foliis lanceolato-ovatis acute ſerratis ſubtus tomentoſis, amentis filiformibus nodoſis. Gron. Virg. 150. Caſtanea Pumila Virginiana, racemoſo fructu parvo in ſingulis capſulis echinatis unico. Pluk. Alm. 90. Cateſb. Car. 1. p. 9.

This ſpecies is called the Dwarf Cheſnut, and grows to the height of ten feet. The ſtem is of a brown colour, and divides into ſeveral branches near the top. The





The Beech Tree.

be ſaid of the Beech: Yet La Cerda, too, ſeems guilty of the ſame miſtake. But, leaving this, there are of our Fagi two or three kinds, viz. the Mountain, where it moſt affects to grow, which is the whiteſt, and moſt ſought after by the Turner; and the Campeſtrial, or wild, which is of a blacker colour, and more durable. They are both to be raiſed from the maſt, and governed like the Oak, of which amply; and that is abſolutely the beſt way of furniſhing a wood; unleſs you will make a Nurſery, and then you are to treat the maſt as you are inſtructed in the chapter of Aſhes, ſowing them in autumn, or later, even after January, or rather nearer the ſpring, to preſerve them from vermin, which are very great de-

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leaves, as deſcribed, are of an oval ſpear-ſhaped figure, acutely ſerrated with an hoary caſt on their underſide. The flowers come out in the ſpring in ſlender knotted catkins. They are of a greeniſh colour, and are rarely ſucceeded by ripe ſeeds in this country. This kind is very hardy, and thrives in a moiſt ſoil and ſhady ſituation.

The Beech, in the Linnæan ſyſtem, is ranked in the claſs and order *Monoecia Polyandria*, which comprehends ſuch plants as have male and female flowers upon the ſame plant, the male flowers having numerous ſtamina.

This tree is propagated by ſowing the maſt in the ſeminary, and afterwards tranſplanting the ſeedlings into the nurſery; for which conſult the directions given in the notes upon page 44.

When theſe trees are deſigned for ſtandards in fields, parks, &c. they muſt be permitted to grow in the nurſery till they are of a proper ſize, when they ſhould be carefully taken up, and planted in the ſame manner as formerly directed for the Elm.—— When intended for woods, the ground muſt be prepared as for the Wych Elm; they ſhould be planted at the ſame diſtance, of the ſame ſize, and thinned in the ſame manner.

The Beech naturally delights in a chalky or ſtony ground, and the bark, upon ſuch land, is clear and ſmooth, a certain indication that the ſoil ſuits the tree. And altho' this timber is not ſo valuable as many other kinds, yet as it will thrive in ſoils and ſituations where few other trees will grow, the propagation of it ſhould be encouraged. Beſides this good quality, it is known to afford an agreeable ſhade; the leaves make a fine appearance in ſummer, and continue as late in autumn as any of the deciduous kinds.

When planted upon ſtony or chalky mountains, the Beech will reſiſt the winds better than moſt other trees, but then the plants ſhould be taken from a nurſery of a ſimilar ſoil; for if they are raiſed upon rich land and in a warm expoſure, and afterwards carried to a bleak ſituation and barren ſoil, they will ſeldom thrive: And this rule is generally ſuppoſed to hold good in moſt other trees, contrary to the practice

BOOK I. vourers of them. But they are likewiſe to be planted of young ſeedlings, to be drawn out of the places where the fruitful trees abound. In tranſplanting them, cut off only the boughs and bruiſed parts two inches from the ſtem to within a yard of the top, but be very ſparing of the root; this for ſuch as are of pretty ſtature. They make ſpreading trees, and noble ſhades with their well-furniſhed and gliſtering leaves, being ſet at forty feet diſtance; but they grow taller and more upright in the foreſts, where I have beheld them, at eight and ten feet, ſhoot into very long poles; but neither ſo apt for timber nor fuel. The ſhade unpropitious to corn and graſs, but ſweet, and, of all the reſt, moſt refreſhing to the

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of all Nurſerymen, who conſtantly raiſe their foreſt-trees upon good land. However, let this be remarked, that the beſt-rooted plants are always produced upon the beſt land—and in all kinds of planting a good root is an eſſential conſideration. Upon the whole, the beſt, and leaſt expenſive method, is to raiſe plantations of this tree by ſowing the maſt where the plants are to remain, agreeable to the general idea given in chap. iii. book i. When raiſed in this manner, they will not ſuſtain the inconveniences ariſing from the change of ſoil and ſituation.

Virgil feelingly deſcribes the cooling ſhade of the Beech, in well-known verſes:

Tityre, tu patulæ recubans ſub tegmine fagi
Sylveſtrem tenui muſam meditaris avena. ECL. i.

Tantum inter denſas, umbroſa cacumina, fagos
Aſſiduè veniebat. ——— ECL. ii.

The antient ſhepherds frequently carved their love verſes upon the green bark of this tree, which was no bad ſubſtitute for the Egyptian papyrus:

Immo hæc, in viridi nuper quæ cortice fagi
Carmina deſcripſi, et modulans alterna notavi,
Experiar. ——— ECL. v.

They alſo wrote upon the bark of the *living* tree, and as the letters muſt have been of a large ſize, and cut deep, we may reaſonably ſuppoſe that they ſeldom went much farther than the name of their miſtreſs with a few tender epithets:

Certum eſt in Sylvis, inter Spelæa ferarum,
Malle pati, teneriſque meos incidere amores
Arboribus: creſcent illæ, creſcetis amores. ECL. x.

The ſame beautiful thought is preſerved in the epiſtle of Œnone to Paris:

Inciſæ ſervant a te mea nomina fagi:
Et legor Œnone falce notata tua.
Et quantum trunci, tantum mea nomina creſcunt:
Creſcite, et in titulos ſurgite recta meos. OVID.

This cuſtom of carving favourite names upon the bark of trees, ſeems to have derived its origin from the ſimplicity of nature, and conſequently muſt have been common

weary ſhepherd—*lentus in umbra*, echoing Amaryllis with his oaten pipe. Mabillon tells us, in his Itinerary, of the old Beech at Villambroſa to be ſtill flouriſhing, and greener than any of the reſt, under whoſe umbrage the famous Eremit Gualbertus had his cell.

This tree, planted in palliſade, affords an uſeful and pleaſant ſkreen to ſhelter Orange and other tender caſe-trees from the parching ſun, &c. growing very tall, and little inferior to the Horn-beam, or Dutch Elm. In the valleys, where they ſtand warm and in conſort, they will grow to a ſtupendous procerity, though the ſoil be ſtony and very barren; alſo upon the declivities, ſides, and tops of high hills, and chalky mountains eſpecially; for, though they thruſt not down ſuch deep and numerous roots as the Oak, and grow to vaſt trees, they will ſtrangely inſinuate their roots into the bowels of thoſe ſeemingly impenetrable places, not much unlike the Fir itſelf, which, with this ſo common tree, the great Cæſar denies to be found in Britain, "*materia cujuſque generis, ut in Gallia, præter Fagum & Abietem*;" but certainly from a grand miſtake, or rather, for that he had not travelled much up into the country *. Virgil reports it will graff with the cheſnut.

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to all ages. Shakeſpear ſays, "A man haunts the foreſt that abuſes our young trees with carving *Roſalind* upon their bark."

Beechen bowls, curiouſly carved, were much prized by the antient ſhepherds. Menalcas, in his diſpute with Damætas, ſpeaks highly in praiſe of his two beechen bowls, conſidering them as ſuperior in value to Damætas's young cow:

——————————— pocula ponam
Fagina, cælatum divini opus Alcimedontis. ECL. iii.

Pliny relates that beechen veſſels were employed in religious ceremonies; but in general they were conſidered as the furniture of the meaneſt people:

Terra rubens crater, pocula fagus erant. OVID.

* From every evidence that can be had of former times, and from the evidence of our own eyes, we muſt ſuppoſe the Fir to be an indigenous tree. The quantity of this kind of wood, diſcovered in many bogs of this Iſland, leaves the matter beyond a doubt: But, with regard to what Cæſar ſays of the Beech, the argument againſt him is not ſo concluſive. The ingenious Mr. Haſted, in the xix. number of the 61ſt vol. of Phil. Tranſ. ſpeaking of Cæſar's obſervation, ſays, "both of which (the *Fir* and "*Beech*) were in the greateſt plenty here at that very time; the latter was particularly "ſo in the county of Kent, the only place he might be ſaid to be acquainted with." But for this Mr. Haſted quotes no authorities.

Book I. 2. The Beech ſerves for various uſes of the houſewife.

Hinc olim juvenis mundi melioribus annis,
Fortunatarum domuum non magna ſupellex
Tota petebatur; ſellas, armaria, lectos,
Et menſas dabat, & lances, & pocula Fagus. COULETUS.

Hence, in the world's beſt years, the humble ſhed
Was happily and fully furniſhed:
Beech made their cheſts, their beds, and the join'd-ſtools:
Beech made the board, the platters, and the bowls.

With it the Turner makes diſhes, trays, rims for buckets, trenchers, dreſſer boards, and other utenſils. It ſerves the Wheeler and Joiner for large ſcrews, &c. The Upholſterer uſes it for ſellies, chairs, bed-ſteads, &c. It makes ſhovels and ſpade-graffs for the Huſbandman, and is uſeful to the Bellows-maker. Floats for fiſhers' nets, inſtead of corks, are made of its bark. It is good for fuel, billet, bavin, and coals, tho' one of the leaſt laſting; and its very ſhavings are good for fining of wine. Peter Creſcentius writes, that the aſhes of Beech, with proper mixture, is excellent to make glaſs with. If the timber lie altogether under water, 'tis little inferior to Elm, as I find it practiſed and aſſerted by ſhipwrights. Of old they made their Vaſa Vindemiatoria and Corbes Meſſoriæ, as we our pots for ſtrawberries, with the rind of this tree; nay, and veſſels to preſerve wine in; and that curiouſly wrought cup, which the ſhepherd, in the Bucolicks, wagers withal, was engraven by Alcimedon upon the bark of the Beech. And an happy age it ſeems:

——————— Nec bella fuerunt,
Faginus adſtabat cum ſcyphus ante dapes. TIBUL.

——————— No wars did men moleſt,
When only beechen bowls were in requeſt.

Of the thin lamina, or ſcale of this wood, as our cutlers call it, are made ſcabbards for ſwords, and band boxes, ſuperinduced with thin leather or paper; boxes for writings, hat-caſes, and formerly book-covers. I wonder we cannot ſplit it ourſelves, but ſend it into other countries for ſuch trifles. In the cavities of theſe trees bees much delight to hive them-

ſelves. Yet for all this, you would not wonder to hear me deplore the ſo frequent uſe of this wood, if you did conſider that the induſtry of France furniſhes that country for all domeſtic utenſils with excellent Walnut, a material infinitely preferable to the beſt Beech, which is indeed good only for ſhade, and for the fire, as being brittle, and exceedingly obnoxious to the worm, where it lies either dry, or wet and dry, as has been noted; but, being put ten days in water, it will exceedingly reſiſt the worm. To which, as I ſaid, it is ſo obnoxious, that I wiſh the uſe of it were, by a law, prohibited all Joiners, Cabinet-makers, and ſuch as furniſh tables, chairs, bed-ſteads, coffers, ſcrews, &c. They have a way to black and poliſh it ſo as to render it like Ebony; and, with a mixture of ſoot and urine, imitate the Walnut; but as the colour does not laſt, ſo neither does the wood itſelf, for I can hardly call it timber, ſoon after the worm has ſeized it, unleſs one ſpunge and imbibe it well with the oil of ſpike, where they have made holes. Ricciolus, indeed, much commends it for oars; and ſome ſay, that the vaſt Argo was built of the Fagus, a good part of it at leaſt, as we learn out of Apollonius: This will admit of interpretation. The Fagus yet, by Claudian, is mentioned with the Alder: CHAP. V.

Sic qui vecturus longinqua per æquora merces
Molitur tellure ratem, vitámque procellis
Objectare parat, Fagos metitur, & Alnos,
Et varium rudibus ſilvis accommodat uſum.

So he that to export o'er ſea his wares,
A veſſel builds, and to expoſe, prepares
His life to ſtorms, firſt Beech and Alder cuts;
And, meaſuring them, to various uſes puts.

But, whilſt we thus condemn the timber, we muſt not omit to praiſe the maſt, which fats our ſwine and deer; and hath, in ſome families, even ſupported men with bread. Chios endured a memorable ſiege by the benefit of this maſt. And, in ſome parts of France, they now grind the buck in mills; it affords a ſweet oil, which the poor people eat moſt willingly. But there is yet another benefit which this tree preſents us; that its very leaves, which make a natural and moſt agreeable canopy all the ſummer, being gathered about the fall, and ſomewhat before they are much froſt-bitten, afford the beſt and eaſieſt mattreſſes in the world to lay

Book I. under our quilts inſtead of ſtraw; becauſe, beſides their tenderneſs and looſe lying together, they continue ſweet for ſeven or eight years long, before which ſtraw becomes muſty and hard: They are thus uſed by divers perſons of quality in Dauphine; and, in Switzerland, I have ſometimes lain on them to my great refreſhment: So as, of this tree, it may properly be ſaid,

——— Silva domus, cubilia frondes. JUVENAL.

The wood's an houſe, the leaves a bed.

Being pruned, it heals the ſcar immediately, and is not apt to put forth ſo ſoon again as other trees.

The ſtagnate water in the hollow trees cures the moſt obſtinate tetters, ſcabs, and ſcurfs in man or beaſt, fomenting the part with it: The leaves, chewed, are wholeſome for the gums and teeth; and the very buds, as they are in winter hardened and dried upon the twigs, make good tooth-pickers. Swine may be driven to maſt about the end of Auguſt; but it is obſerved, that, where they feed on it before it be mature, it intoxicates them for a while; and that, generally, their fat is not ſo good and ſolid, but drips away too ſoon. In the mean time the kernels of the maſt are greedily devoured by ſquirrels, mice, and, above all, by dormice, who, harbouring in the hollow trees, grow ſo fat, that, in ſome countries abroad, they take infinite numbers of them, I ſuppoſe, to eat: And what relief they give to thruſhes, black-birds, fieldfares, and other birds, every body knows.



The Horntam Tree.

Published August 1st 1788 by Stanford Hall as the Act directs

J. Miller del. & sc.

CHAP. VI.

The HORN-BEAM *.

1. OSTRYS, the Horn-beam. This, by ſome, is called the Horſe-beech, from the reſemblance of the leaf, and in Latin (ignorantly) the Carpinus. It is planted of ſets, though it may likewiſe be raiſed from the ſeeds, which, being mature in Auguſt, ſhould be ſown in October; theſe lie a year in the bed, which muſt be well and carefully ſhaded ſo ſoon as they peep. But the more expeditious way is by layers or ſets of about an inch diameter, and cut within half a foot of the earth: Thus it will advance to a conſiderable tree. The places it chiefly deſires to grow in, are cold hills, ſtiff ground, and the barren and moſt expoſed parts of woods. We have it no where more abounding, in the ſouth, than in the woods of Hertfordſhire; very few weſtward.

2. Amongſt other uſes, it ſerves for mill-cogs, for which it excels either Yew or Crab; yoak-timber, whence of old, and that it was as well

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* Of this genus Mr. Miller enumerates four ſpecies.

1. CARPINUS (*Vulgaris*) ſquamis ſtrobilorum planis. Hort. Cliff. 447. *Horn-beam with flat ſcales to the cones.* Carpinus. Dod. Pemp. 841. *Common Horn-beam.*

This ſort is very common in many parts of England, but is rarely ſuffered to grow as a timber-tree, being generally pollarded by the country people; yet, where the young trees have been properly treated, they have grown to a large ſize. I have ſeen ſome of them in woods, upon a cold ſtiff clay, that have been near ſeventy feet high, with large, noble, fine ſtems, perfectly ſtraight and ſound. Of late years, this has only been conſidered as a ſhrub, and ſeldom cultivated but for underwood in the country, and for hedges in the nurſeries, after the French taſte; for in moſt of their great gardens, their cabinets, &c. are formed of theſe trees, as are their trelliſſes and hedges which ſurround their plantations. But, ſince theſe ornaments have been baniſhed from the Engliſh gardens, there has been little demand for it in our nurſeries. As the Horn-beam will thrive upon cold, barren, and expoſed hills, and in ſuch ſituations where few other trees will grow, it may be cultivated to advantage by the proprietors of ſuch lands. It will reſiſt the violence of winds better than moſt other trees, and is by no means ſlow in its growth. But where it is propagated for timber, it ſhould be raiſed from ſeeds, upon the ſame ſoil, and in the ſame ſituation where it is deſigned to grow; and not be brought from very rich land, and a warm expoſure. The ſeeds ſhould be ſown in the autumn, ſoon after they are ripe; for, if they are kept out of the ground till the

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flexible as tough, it was called ζυγία; heads of beetles, ſtocks and handles of tools. It is likewiſe, for the Turner's uſe, excellent. It makes good fire-wood, where it burns like a candle; and was of old ſo employed:

Carpinus tædas fiſſa faceſque dabit.

Being planted in ſmall foſſes or trenches, at half a foot interval, and in the ſingle row, it makes the nobleſt and ſtatelieſt hedge for long walks in

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ſpring, the plants will not come up till the following year. When the plants appear, they muſt be kept clear from weeds, and treated as other foreſt-trees. In two years they will be fit to tranſplant; for the ſooner all trees that are deſigned for timber are planted where they are to remain, the larger they will grow, and the wood will be firmer and more durable. When theſe are not intermixed with other trees, they ſhould be planted cloſe, eſpecially on the outſide of the plantations, that they may protect and draw each other up; and if they are kept clean from weeds for three or four years, it will greatly promote their growth; after which the plants will need no further aſſiſtance in that particular. As the trees advance in growth, they ſhould be thinned, which muſt be done with caution, cutting away the moſt unpromiſing plants gradually, ſo as not to let in too much cold air, at once, upon thoſe that are left, eſpecially on the borders of the plantation. For, in all young plantations of timber, it is much better to take away a few trees every year, than, as is too often practiſed, to permit all to grow till they are fit to be cut as under-wood, when a few trees are left for timber. By this injudicious practice, ſo much cold air is ſuddenly let in upon the timber-trees, that their growth is retarded for ſome years. The leaves of the Horn-beam remain upon the branches till the young buds puſh them off in the ſpring, which renders them proper to plant round the borders of other plantations in expoſed ſituations; where they will defend the other trees in winter, and thereby promote their growth.

2. CARPINUS *(Oſtria)* ſquamis ſtrobilorum inflatis. Hort. Cliff. 447. *Horn-beam with inflated ſcales to the cones.* Oſtrya ulmo ſimilis, fructu racemoſo lupulo ſimili. Bauh. Pin. 427. *The Hop Horn-beam.*

This kind ſheds its leaves, in winter, with the Elm and other deciduous trees: Though but lately known in this country, it is very common in Germany, growing promiſcuouſly with the common ſort. The Hop Horn-beam is of quicker growth than the common kind; but the goodneſs of the timber is not yet known, there being but few of theſe trees growing in England upon their own roots, moſt of them having been grafted upon the common Horn-beam, the uſual method of propagating them in our nurſeries. But the trees, ſo raiſed, are of ſhort duration; for the graft generally grows much faſter than the ſtock, ſo that

gardens or parks, of any tree whatſoever whoſe leaves are deciduous, and forſake their branches in winter, becauſe it grows tall, and ſo ſturdy as not to be wronged by the winds; beſides, it will furniſh to the very foot of the ſtem, and flouriſhes with a gloſſy and poliſhed verdure, which is exceeding delightful, of long continuance, and, of all other the harder woods, the ſpeedieſt grower, maintaining a ſlender upright ſtem, which does not come to be bare and ſticky in many years. It has yet this (ſhall I call it) infirmity, that, keeping on its leaves till new ones thruſt them off, it is clad in ruſſet all the winter long. That admirable eſpalier hedge in the long middle walk of the Luxemburgh garden at Paris, than which there is nothing more graceful, is planted of this tree; and ſo was that cradle, or cloſe-walk, with that perplext canopy which lately covered the ſeat in his Majeſty's garden at

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in a few years there is a great diſproportion in their ſize; and where they happen to ſtand expoſed to ſtrong winds, the graft is frequently broken from the ſtock, after many years growth.

3. CARPINUS *(Orientalis)* foliis ovato-lanceolatis ſerratis ſtrobilis brevibus. *Horn-beam with oval, ſpear-ſhaped, ſawed leaves, and the ſhorteſt cones.* Carpinus orientalis folio minori, fructu brevi. T. Cor. 40. *Eaſtern Horn-beam, with a ſmaller leaf and ſhorter fruit.*

This tree is of humble growth, rarely riſing, in this country, above ten or twelve feet in height. As it ſhoots out many horizontal, irregular branches, it cannot be trained up to a ſtem. The leaves are much ſmaller than thoſe of the common Horn-beam, and the branches grow cloſer together, which qualifies it for low hedges, where ſuch are wanted in gardens. Being a very tonſile plant, it may be kept in leſs compaſs than almoſt any deciduous tree. It is as hardy as any of the other ſorts; but, at preſent, it is rare in our nurſeries.

4. CARPINUS *(Virginiana)* foliis lanceolatis acuminatis, ſtrobilis longiſſimis. *Horn-beam with pointed, ſpear-ſhaped leaves, and the longeſt cones.* Carpinus Virginiana floreſcens. Pluk. *Virginian flowering Horn-beam.*

This ſort grows to the height of thirty feet, and is of quicker growth than either of the former kinds. It ſheds its leaves in autumn, about the ſame time with the Elm. During the time of its verdure it makes a good appearance, being cloathed with leaves of a deep, ſtrong, green colour, reſembling the long-leaved Elm more than the Horn-beam.

The Horn-beam, in the Linnæan ſyſtem, is ranked in the claſs and order *Monoecia Polyandria*, which comprehends ſuch plants as have male and female flowers on the ſame plant, the male flowers having numerous ſtamina. The leaves begin to open about

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Hampton-Court; and, as now I hear, they are planted in perfection at New-Park, the delicious villa of the noble Earl of Rocheſter, belonging once to a near kinſman of mine, who parted with it to King Charles the Firſt of bleſſed memory. Theſe hedges are tonſile; but, where they are maintained to fifteen or twenty feet height, which is very frequent in the places before mentioned, they are to be cut, and kept in order with a ſythe of four feet long, and very little falcated; this is fixed on a long ſneed, or ſtraight handle, and does wonderfully expedite the trimming of theſe and the like hedges. An oblong ſquare, paliſadoed with this plant, or the Flemiſh Ornus, as is that I am going to deſcribe, and may be ſeen

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the latter end of March, and are quite out by the middle of April; and the flowers are in full bloom towards the end of that month.

All theſe ſorts of Horn-beams, the firſt excepted, ſhould be propagated by layers; for which purpoſe a few plants ſhould be procured for ſtools; thoſe, for the Eaſtern Horn-beam, ſhould be planted a yard aſunder, and the others about two yards. After the plants have made ſome young ſhoots, they ſhould be layered in the autumn, and by that time twelvemonth they will have ſtruck root; at which time, or early in the ſpring, they ſhould be taken off and planted in the nurſery, obſerving to bruſh up the ſtools, that they may afford young ſhoots to be layered the ſucceeding autumn.

In Weſtphalia, and other parts of North Germany, the Horn-beam is in great repute. There they make a hedge of it which anſwers Columella's deſcription of a good fence:

——— Neu ſit pecori, neu pervia furi. DE HORT.

When the German huſbandman erects a fence of Horn-beam, he throws up a parapet of earth, with a ditch on each ſide, and plants his ſets (raiſed from layers) in ſuch a manner, as that every two plants may be brought to interſect each other in the form of a St. Andrew's croſs. In that part where the two plants croſs each other, he ſcrapes off the bark, and binds them cloſely together with ſtraw. In conſequence of this operation, the two plants conſolidate in a ſort of indiſſoluble knot, and puſh from thence horizontal, ſlanting ſhoots, which form a living paliſado, or *chevaux de friſe*; ſo that ſuch a protection may be called a rural fortification. Theſe hedges, being pruned annually, and with diſcretion, will, in a few years, render the fence impenetrable in every part. It is not uncommon in Germany to ſee the ſides of high roads thus guarded for many miles together; and it were to be wiſhed that this example was followed in ſome places of this kingdom. I am the more inclined to recommend ſuch hedges, as the Horn-beam is not delicate in point of ſoil, but will even thrive on land ſeemingly barren. When properly pruned, it will put out ſtrong lateral ſhoots, within three inches of the ground, by which means it makes an impenetrable fence againſt cattle. It is alſo of quick growth; a thing of great conſequence in the improvement of waſte land.

in that inexhauſtible magazine at Brompton-park, (cultivated by thoſe two induſtrious fellow-gardeners, Mr. London and Mr. Wiſe) affords ſuch an *umbraculum frondium*, the moſt natural, proper ſtation, and convenience for the protection of our Orange trees, Myrtles, and other rare Perennials and Exoticks, from the ſcorching darts of the ſun, and heat of ſummer; placing the caſes, pots, &c. under this ſhelter, when, either at the firſt peeping out of the winter concleave, or during the increaſing heat of ſummer, they ſo are ranged and diſpoſed, as to adorn a noble area of a moſt magnificent paradiſian dining-room, to the top of Hortulan pomp and bliſs, ſuperior to all the artificial furniture of the greateſt prince's court. Here the Indian Narciſſus, Tuberoſes, Japan Lillies, Jaſmines, Jonquills, Periclimena, Roſes, Carnations, with all the pride of the parterre, intermixt between the tree-caſes, flowry vaſes, buſts, and ſtatues, entertain the eye, and breathe their redolent odours and perfumes to the ſmell. The golden fruit, the apples of the Heſperides, together with the delicious ananas gratify the taſte, whilſt the chearful ditties of canorous birds recording their innocent amours to the murmurs of the bubbling fountain, delight the ear. At the ſame time the charming accents of the fair and virtuous ſex, preferable to all the admired compoſures of the moſt ſkilful muſicians, join in concert with hymns and hallelujahs to the bountiful and glorious Creator, who has left none of the ſenſes which he has not gratified at once with their moſt agreeable and proper objects.

But, to return to Brompton: It is not to be imagined what a ſurpriſing ſcene ſuch a ſpacious ſaloon, tapeſtried with the natural verdure of the glittering foliage, preſents the ſpectator, and recompenſes the toil of the ingenious planter; when, after a little patience, he finds the ſlender plants (ſet but at five or ſix feet diſtance, nor much more in height, well pruned and dreſſed) aſcend to an altitude ſufficient to ſhade and defend his paradiſian treaſure, without excluding the milder gleams of the glorious and radiant planet, with his cheriſhing influence and kindly warmth, to all within the incloſure—refreſhed with the cooling and early dew pregnant with the ſweet exhalations, which the indulgent mother and teeming earth ſends up to nouriſh and maintain her numerous and tender offspring.

But, after all, let us not dwell here too long, whilſt the inferences to be derived from thoſe tempting and temporary objects, prompt us to raiſe

Book I. our contemplations a little on objects yet more worthy our nobleſt ſpeculations, and all our pains and curioſity, repreſenting that happy ſtate above, namely, the cœleſtial paradiſe: Let us, I ſay, ſuſpend our admiration a while of theſe terreſtrial gaieties, which are of ſo ſhort continuance, and raiſe our thoughts from being too deeply immerſed and rooted in them, aſpiring after thoſe ſupernal, more laſting, and glorious abodes, namely, a paradiſe, not like this of ours, with ſo much pains and curioſity, made with hands, but eternal in the heavens, where all the trees are trees of life, the flowers all Amaranths; all the plants perennial, ever verdant, ever pregnant; and where thoſe who deſire knowledge may fully ſatiate themſelves; taſte freely of the fruit of that tree which coſt the firſt Gardener and Poſterity ſo dear; and where the moſt voluptuous inclinations to the allurements of the ſenſes may take and eat, and ſtill be innocent; no forbidden fruit; no ſerpent to deceive; none to be deceived.

Hail! O hail, then, and welcome, you bleſſed Elyſiums, where a new ſtate of things expects us; where all the pompous and charming delights that detain us here a while, ſhall be changed into real and ſubſtantial fruitions, eternal ſprings, and pleaſure intellectual, becoming the dignity of our nature!

I beg no pardon for the application, but deplore my no better uſe of it; and that, whilſt I am thus upon the wing, I muſt now deſcend ſo ſoon again.

Of all the foreſters, the Horn-beam preſerves itſelf beſt from the brutting of deer, and therefore to be kindly entertained in parks. But the reaſon why, with us, we rarely find it ample and ſpreading, is, that our huſbandman ſuffers too large and grown a lop before he cuts them off, which leaves ſuch ghaſtly wounds as often prove exitial to the tree, or cauſe it to grow deformed and hollow, and of little worth but for the fire; whereas, were they oftener taken off when the lops were younger, though they did not furniſh ſo great wood, yet the continuance, and flouriſhing of the tree, would more than recompenſe it. For this cauſe,

3. They very frequently plant a clump of theſe trees before the entries of moſt of the great towns in Germany, to which they apply timber-frames for convenience of the people to ſit and ſolace in. Scamozzi, the Architect, ſays, "That in his time he found one whoſe branches extended

ſeventy feet in breadth;" this was at Vuimfen, near the Necker, belonging to the Duke of Wirtemberg: but that which I find planted before the gates of Straſburgh is a Platanus and a Lime-tree growing hard by one another, in which is erected a Pergola of fifty feet wide, and eight feet from the ground, having ten arches of twelve feet height, all ſhaded with their foliage; beſides this there is an over-grown Oak which has an arbour in it of ſixty feet diameter.

CHAP. VII.

The ASH *.

BOOK I. 1. FRAXINUS, the Aſh. This tree with us is reputed male and female, the one affecting the higher grounds, the other the plains, of a whiter wood, and riſing many times to a prodigious ſtature, ſo as in forty years from the key, an Aſh hath been ſold for thirty pounds ſterling. And I have been credibly informed, that one perſon hath planted ſo much of this one ſort of timber in his life-time, as hath been valued worth fifty thouſand pounds to be bought. Theſe are pretty encouragements for a ſmall and pleaſant induſtry. That there is a lower and more knotty ſort, every huſbandman can diſtinguiſh.

The keys, or tongues, being gathered from a young thriving tree when they begin to fall, (which is about the end of October, and the enſuing month) are to be laid to dry, and then ſowed any time betwixt that and Chriſtmas; but not altogether ſo deep as your former maſts. Thus they

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* Of this genus Mr. Miller enumerates ſix ſpecies; but properly there are only three.

1. FRAXINUS *(Excelſior)* foliolis ſerratis, floribus apetalis. Lin. Sp. Plant. 1509. *Aſh-tree whoſe ſmaller leaves are ſerrated, and flowers having no petals.* Fraxinus excelſior. C. B. P. 416. *The common Aſh.*

This is the common Aſh-tree which grows naturally in moſt parts of England, and is ſo well known as to need no deſcription. The leaves of this ſort have generally five pair of lobes, and are terminated by an odd one; they are of a very dark green, and their edges are ſlightly ſawed. The flowers are produced in looſe ſpikes from the ſide of the branches, which are ſucceeded by flat ſeeds, which ripen in autumn: there is a variety of this with variegated leaves, which is preſerved in ſome gardens.

2. FRAXINUS *(Rotundifolia)* foliolis ovato-lanceolatis ſerratis, floribus corollatis. *Aſh-tree whoſe ſmaller leaves are oval, ſpear-ſhaped, and ſawed, and flowers having petals.* Fraxinus rotundiore folio. C. B. P. 416. *Aſh-tree with a rounder leaf*, commonly called *Manna Aſh.*

This ſort grows naturally in Calabria, and is generally ſuppoſed to be the tree from whence the manna is collected, which is an exſudation from the leaves of the tree. The ſhoots of this tree are much ſhorter, and the joints cloſer together than thoſe of the firſt ſort; the ſmall leaves are ſhorter, and deeper ſawed on their edges,



The common Ash of Tree.

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J. Miller del. et sculp.

do in Spain, from whence it were good to procure ſome of the keys from the moſt fruitful trees. A very narrow ſeminary will be ſufficient to ſtore a whole country; they will lie a full year in the ground before they appear, therefore you muſt carefully fence them all that time, and have patience; but if you would make a conſiderable wood of them at once, dig or plow a parcel of ground, as you would prepare it for corn, and with the corn, eſpecially oats, (or what other grain you think fitteſt) ſow alſo good ſtore of keys, ſome Crab-kernels, &c. amongſt them. Take off your crop of corn or ſeed in its ſeaſon, and the next year following it will be covered with young Aſhes, which will be fit either to ſtand, which I prefer, or be tranſplanted for divers years after; and theſe you will find to be far better than any you can gather out of the woods (eſpecially ſuckers which are worth nothing) being removed at one foot ſtature, the ſooner the better; for Aſhes of two years thus taken out of the nurſery, ſhall outſtrip thoſe

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and are of a lighter green. The flowers come out from the ſide of the branches, which are of a purple colour, and appear in the ſpring before the leaf comes out. This tree is of humble growth, ſeldom riſing more than fifteen or ſixteen feet high in England.

3. FRAXINUS *(Ornus)* foliolis ſerratis, floribus corollatis. Lin. Sp. Plant. 1510. *Aſh-tree whoſe ſmaller leaves are ſawed, and flowers having petals.* Fraxinus humilior ſive altera Theophraſti, minore & tenuiore folio. C. B. P. 416. *Dwarf Aſh of Theophraſtus, with ſmaller and narrower leaves.*

This is a low tree, which riſes about the ſame height as the ſecond; the leaves are much ſmaller and narrower than thoſe of the firſt, but are ſawed on their edges, and are of the ſame dark colour. The flowers of this ſort have petals, which are wanting in the common Aſh.

4. FRAXINUS *(Paniculata)* foliolis lanceolatis glabris, floribus paniculatis terminatricibus. *Aſh-tree with ſmooth ſpear-ſhaped leaves and flowers growing in panicles at the ends of the branches.* Fraxinus floriſera botryoides. Mor. Præl. 265. *The flowering Aſh.*

This ſort was raiſed by the late Dr. Uvedale at Enfield, from ſeeds which were brought from Italy by Dr. William Sherard, where the trees grow naturally; it was ſuppoſed to be a different ſort from that mentioned by Dr. Morriſon, in his Præludia Botanica, but by comparing them together they appear to be the ſame. The leaves have but three or four pair of lobes, (or ſmall leaves) which are ſhort, broad, and ſmooth, of a lucid green, and irregularly ſawed on the edges; the midrib of the great leaf is jointed, and ſwells where the leaves come out. The flowers grow in looſe panicles at the end of the branches: theſe are moſt of them

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of ten taken out of the hedge, provided you defend them well from cattle, which are exceedingly liquoriſh after their tops: The reaſon of this haſty tranſplanting, is to prevent their obſtinate and deep rooting, *tantus amor terræ*——which makes them hard to be taken up when they grow older, and that being removed, they take no great hold till the ſecond year, after which they come away amain; yet I have planted them of five and ſix inches diameter, which have thriven as well as the ſmaller wands. You may accelerate their ſpringing by laying the keys in ſand, and ſome moiſt fine earth, ſtratum ſuper ſtratum; but lay them not too thick, or double,

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male, having two ſtamina in each, but no germen or ſtyle; they are of a white herbaceous colour, and appear in May. As this ſort very rarely produces ſeeds in England, it is propagated by grafting or budding upon the common Aſh.

5. FRAXINUS *(Nov. Angl.)* foliolis integerrimis, petiolis teretibus. Flor. Virg. 122. *Aſh-tree with the ſmall leaves entire, and taper foot-ſtalks.* Fraxinus ex Novâ Angliâ pinnis foliorum in mucronem productioribus. Rand. Cat. Hort. Chelſ. *New-England Aſh with long acute points to the wings of the leaves.*

This was raiſed from ſeeds, which were ſent from New-England in the year 1724, by Mr. Moore. The leaves of this tree have but three, or at moſt but four pair of lobes, (or ſmall leaves) which are placed far diſtant from each other, and are terminated by an odd lobe, which runs out into a very long point; they are of a light green and entire, having no ſerratures on their edges; this tree ſhoots into ſtrong irregular branches, but doth not grow to a large ſize in the trunk. It is propagated by grafting or budding upon the common Aſh.

6. FRAXINUS *(Caroliniana)* foliolis integerrimis, petiolis teretibus, fructu latiore. Prod. Leyd. 533. *Aſh-tree with entire leaves and taper foot-ſtalks.* Fraxinus Caroliniana, latiore fructu. Rand. Cat. H. Chelſ. *Carolina Aſh with a broad fruit.*

This laſt ſort was raiſed from ſeeds which were ſent from Carolina in the year 1724, by Mr. Cateſby. The leaves have ſeldom more than three pair of lobes, the lower being the leaſt, and the upper the largeſt; theſe are about five inches long and two broad, of a light green colour, and ſlightly ſawed on their edges; the foot-ſtalk, or rather the midrib, of the leaves is taper, and has ſhort downy hairs; the ſeeds are broader than thoſe of the common Aſh, and are of a very light colour. As this ſort hath not yet produced ſeeds in England, it is propagated by grafting or budding upon the common Aſh.

This genus of plants, in the Linnæan ſyſtem, is ranked in the claſs and order *Polygamia Dioecia*, the Polygamy being upon two diſtinct plants.

The curious obſerver of nature will find the flowers of the Aſh begin to open about the ſixteenth of April, and about the twenty-ſecond they will be in full blow. The

and in a covered, though airy place for a winter, before you ſow them; and the ſecond year they will come away mainly, ſo you weed, trim, and cleanſe them. Cut not his head at all, (which being young is pithy) nor by any means the fibrous part of the roots, only that down-right or tap-root (which gives our huſbandmen ſo much trouble in drawing) is to be totally abated: But this work ought to be in the increaſe of October or November, and not in the ſpring. We are, as I told you, willing to ſpare his head rather than the ſide-branches, (which, whilſt young, may be cut cloſe) becauſe being yet young, it is but of a ſpungy ſubſtance, but

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leaves, alſo, of ſome of theſe trees growing in favourable ſituations, will, by this time, be out; though others will not ſhew their foliage till the middle of May.

The common Aſh is eaſily propagated from the keys, for which conſult the directions given in page 44. The foreign kinds may alſo be raiſed from ſeeds, when they can be procured from abroad: Budding, however, is the general method; ſo that thoſe who have not a correſpondence in the countries where they grow naturally, ſhould procure a plant or two of a ſort, and ſhould raiſe young Aſhes of the common ſort for ſtocks. Theſe ſtocks ſhould be planted out in the nurſery, a foot aſunder, and two feet diſtant in the rows. When they are one year old, and grown to be about the thickneſs of a bean-ſtraw, they will be of a proper ſize for working. A little after Midſummer is the time for the operation; and care muſt be obſerved not to bind the eye too tight. They need not be unlooſed before the latter end of September. In March, the head of the ſtock ſhould be taken off a little above the eye; and, by the end of the ſummer following, if the land be good, they will have made ſurprizing ſtrong ſhoots, many of them ſix feet or more.

The timber of the Aſh (the Oak only excepted) ſerves for the greateſt variety of uſes of any tree in the foreſt. Tho' a handſome tree, it ought by no means to be planted for ornament in places deſigned to be kept neat, becauſe the leaves fall off, with their long ſtalks, very early in the autumn, and by their litter deſtroy the beauty of ſuch places. But although it is not well adapted to plant near gravel-walks and pleaſure-grounds, it is not only proper for woods, but alſo to form clumps in large parks, or it may be ſet out for ſtandards; but it ſhould never be planted on the borders of tillage land, becauſe the dripping of the leaves is extremely prejudicial to corn, and the roots have a powerful tendency to draw the nouriſhment from the ground. Neither ſhould it be planted near paſture ground, for if the cows eat the leaves or ſhoots, the butter will become rank and of ſmall value; and it is remarked that butter made about Guild-ford, Godalmin, and ſome other parts of Surry, where Aſh-trees grow in almoſt all the paſtures, is ſeldom good. In all good dairy-farms an Aſh-tree is never permitted to grow, except in woods.

A wood of theſe trees, rightly managed, will produce conſiderable advantages to the owner; for by the under-wood, which will be fit to cut every fourteen or fifteen years

Book I. being once well fixed, you may cut him as cloſe to the earth as you pleaſe; it will cauſe him to ſhoot prodigiouſly, ſo as in a few years to be fit for pike-ſtaves; whereas if you take him wild out of the foreſt, you muſt of neceſſity ſtrike off the head, which much impairs him. Hedge-row Aſhes may the oftener be decapitated, and will ſhew their heads again ſooner than other trees ſo uſed. Young Aſhes are ſometimes in winter froſt-burnt, black as coals, and then to uſe the knife is ſeaſonable, though they do commonly recover of themſelves ſlowly. In South Spain, (where, as we ſaid, are the beſt) after the firſt dreſſing they let them grow till they are ſo big, as being cleft into four parts, each part is ſufficient to make a pike-ſtaff: I am told there is a Flemiſh Aſh, planted by the Dutchmen in Lincolnſhire, which in ſix years grows to be worth twenty ſhillings the

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for hop-poles, &c. there will be a regular income ſuperior to the rent of the neighbouring lands, and ſtill there will be a ſtock left for timber, which, like an eſtate in reverſion, will, at ſome future period, pour in conſiderable riches.

As the quickneſs of growth will depend upon the goodneſs of ſoil, the number of years from the firſt planting to the firſt fall, will vary accordingly; though, if the wood be large, I would adviſe to have the firſt fall of poles very ſoon, that there may be an annual ſale till the wood has been wholly cut down; and this ſhould be ſo contrived, that the year after the laſt quarter is cut, that which was firſt begun on may be ready for a ſecond falling. This will happen at an interval of about fifteen or twenty years, by which time the poles will be large; but if they are wanted for ſmaller purpoſes, the fall ſhould be proportionably ſooner.

After the firſt fall, great care ſhould be taken to grub up the worſt ſtools where they are too thick; for now every ſtool will ſend out four or five branches. But before any are grubbed up, a proper number ſhould be pitched on to grow to timber; and theſe ſhould always be ſuch trees as are the largeſt, moſt healthy, and thriving.

The Aſh will grow exceeding well upon almoſt any ſoil; and the beſt time for felling the timber is in the winter months, from November to February; for if it be cut later, it is not only ſubject to a worm which greatly damages the timber, but the bark will divide from the ſtools, to their great detriment.

It is obſervable, that Pollards ſhould always be lopped in the ſpring; and it is farther to be remarked of theſe, that when the head of a Pollard begins to be hollow, the body then enters upon a ſtate of decay; ſo that if this is deſigned to be uſeful, the Pollard ſhould be then wholly cut down.

Pollards are of great ſervice where fuel is ſcarce; a few of theſe trees will turn out many loads of lop, and the wood of them makes the ſweeteſt of all fires, and will burn well either green or dry.

One caution more let me give with reſpect to theſe trees: Do not let the interval between their lopping be too great: If the branches be ſuffered to grow to a very great thickneſs, the taking them off will proportionably injure the tree.

tree; but I am not aſſured whether it be the Aſh or Abele; either of them were, upon this account, a worthy encouragement, if at leaſt the latter can be thought to bear that price, which I much queſtion: From theſe low cuttings come our Ground-Aſhes, ſo much ſought after for arbours, eſpaliers, and other pole-works: they will ſpring in abundance, and may be reduced to one for a ſtandard tree, or for timber, if you deſign it; for thus, Hydra-like, a ground-cut Aſh

Per damna, per cædes, ab ipſo
Ducit opes animumque ferro. HOR.

By havock, wounds, and blows,
More lively and luxuriant grows.

Aſh may be propagated from a bough ſlipt off with ſome of the old wood a little before the bud ſwells, but with difficulty by layers. Such as they reſerve for ſpears in Spain, they keep ſhriped up cloſe to the ſtem, and plant them in cloſe order, and moiſter places. Theſe they cut above the knot (for the leaſt nodoſity ſpoils all) in the decreaſe of January, which were of the lateſt for us. It is reported that the Aſh will not only receive its own kind, but graff, or be inoculated, with the Pear and Apple; but to what improvement I know not.

3. It is by no means convenient to plant Aſh in plow-lands, for the roots will be obnoxious to the coulter; and the ſhade of the tree is malignant both to corn and graſs, when the head and branches over-drip and emaciate them; but in hedge-rows and plumps they will thrive exceedingly, where they may be diſpoſed at nine or ten feet diſtance, and ſometimes nearer: But in planting of a whole wood of ſeveral kinds of trees for timber, every third ſet at leaſt ſhould be an Aſh. The beſt Aſh delights in the beſt land, which it will ſoon impoveriſh, yet grows in any, ſo it be not over ſtiff, wet, and approaching to the marſhy, unleſs it be firſt well drained: By the banks of ſweet and cryſtal rivers and ſtreams I have obſerved them to thrive infinitely. One may obſerve as manifeſt a difference in the timber of Aſhes as of the Oak, much more than is found in any one kind of Elm, *cæteris paribus*; for ſo the Ground-Aſh, like the Oak, much excels a bough or branch of the ſame bulk for ſtrength and toughneſs; and in yet farther emulation of the Oak, it has been known to prove as good and laſting timber for building, nay, preferred before it,

Book I. where there has been plenty of Oak; vaſt difference there is alſo in the ſtrength of ground and quartered Aſh. It is likewiſe remarkable that the Aſh, like the Cork-tree, grows when the bark is as it were quite peeled off, as has been obſerved in ſeveral foreſts, where the deer have bared them as far as they could climb. Some Aſh is curiouſly cambleted and veined, I ſay, ſo differently from other timber, that our ſkilful Cabinet-makers prize it equal with Ebony, and give it the name of Green-Ebony, which their cuſtomers pay well for; and when our wood-men light upon it, they may make what money they will of it: But to bring it to that curious luſtre, ſo as 'tis hardly to be diſtinguiſhed from the moſt curiouſly diapered Olive, they varniſh their work with the China Varniſh, hereafter deſcribed, which infinitely excels linſeed oil, that Cardan ſo commends, ſpeaking of this root. The truth is, the *Bruſcum*, or *Molluſcum*, to be frequently found in this wood, is nothing inferior to that of Maple, (of which hereafter) being altogether as exquiſitely diapered, and waved like the Gamahes of Achates. Dr. Plott ſpeaks of an eminent example of divers ſtrange figures of fiſh, men, and beaſts to be found in a dining-table made of an old Aſh, ſtanding in a Gentleman's houſe ſomewhere in Oxfordſhire; upon which is mentioned that of Jacobus Gafferellus, in his book of Unheard-of Curioſities, namely, of a tree found in Holland, which being cleft, had, in ſeveral ſlivers, the figures of a chalice, a prieſt's albe, his ſtole, and ſeveral other pontifical veſtments; of this ſort was the Elm growing at Middle-Aſton in Oxfordſhire, a block of which wood being cleft, there came out a piece ſo exactly reſembling a ſhoulder of veal, that it was worthy to be reckoned among the curioſities of this nature.

4. The uſe of Aſh is (next to that of Oak itſelf) one of the moſt univerſal: It ſerves the Soldier——*& Fraxinus utilis haſtis*——and heretofore the Scholar, who made uſe of the inner bark to write on, before the invention of paper. The Carpenter, Wheel-wright, and Cart-wright find it excellent for plows, axle-trees, wheel-rings, harrows, bulls; it makes good oars, blocks for pullies and ſheffs, as Seamen name them: For drying herrings no wood is like it, and the bark is good for the tanning of nets; and like the Elm, for the ſame property, (of not being ſo apt to ſplit and ſcale) is excellent for tenons and mortiſes; alſo for the Cooper, Turner, and Thatcher; nothing is like it for our garden paliſade-hedges, hop-yards, poles and ſpars, handles and ſtocks for tools, ſpade-trees, &c. In ſum, the Huſbandman cannot be without the Aſh for his carts, ladders, and other tackling, from the pike to the plow, ſpear and bow; for of Aſh were they

formerly made, and therefore reckoned amongſt thoſe woods which, after long tenſion, has a natural ſpring, and recovers its poſition; ſo as in peace and war it is a wood in higheſt requeſt: In ſhort, ſo uſeful and profitable is this tree, next to the Oak, that every prudent Lord of a Manor ſhould employ one acre of ground with Aſh to every twenty acres of other land, ſince in as many years it would be more worth than the land itſelf. There is extracted an oil from the Aſh, by the proceſs on other woods, which is excellent to recover the hearing, ſome drops of it being diſtilled warm into the ears; and for the caries or rot of the bones, tooth-ach, pains in the kidnies and ſpleen, the anointing therewith is moſt ſovereign*. Some have uſed the ſaw-duſt of this wood, inſtead of guaiacum, with ſucceſs. The chemiſts exceedingly commend the ſeed of Aſh to be an admirable remedy for the ſtone: but whether by the power of magic or nature, I determine not. I have heard it affirmed with great confidence, and upon experience, that the rupture, to which many children are obnoxious, is healed, by paſſing the infant thro' a wide cleft made in the bole or ſtem of a growing Aſh-tree; it is then carried a ſecond time round the Aſh, and cauſed to repaſs the ſame aperture as before. The rupture of the child being bound up, it is ſuppoſed to heal as the cleft of the tree cloſes and coaleſces. The manna of Calabria is found to exſude out of the leaves and boughs of this tree during the hot ſummer months †: Laſtly, the white and rotten dotard part compoſes the ground for our Gallants ſweet powder; and the truncheons

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* As Mr. Evelyn does not profeſs any knowledge in medicine, but on the contrary makes an apology for his ignorance, in the fifth page of this work; I ſhall only remark, that the boaſted properties of the oil obained from the Aſh are not to be depended on, being only in common with oil obtained from any other tree. The curing a ruptured child, by paſſing its body through a cleft made in the bole of a young Aſh-tree, has no foundation in reaſon or philoſophy.

† Upon the authority of Mr. Miller I mentioned the Fraxinus *(Rotundifolia)* as being the Aſh from whence the manna was procured; but I am now better informed by Dr. Dominico Cirilli, that it is the Fraxinus *(Ornus)*. The Doctor, in a letter addreſſed to Dr. Watſon, and inſerted in the ſixtieth vol. of the Philoſoph. Tranſ. ſays, "The Manna-tree, commonly called Ornus by Botaniſts, is a kind of Aſh, and is to be found under the name of Fraxinus Ornus in Linnæus's Sp. Plant. In all the woods near Naples the Manna-tree is to be found very often, but, for want of cultivation, it never produces any manna, and is rather a ſhrub than a tree. The manna is generally of two kinds, not on account of the intrinſic quality of them being different, but becauſe they are got in a different manner. In order to have the manna, thoſe who have the management of the woods of the Orni in the months of July and Auguſt,

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make the third ſort of the moſt durable coal, and is, of all other, the ſweeteſt of our foreſt fuelling, and the fitteſt for Ladies chambers; it will burn even whilſt it is green, and may be reckoned amongſt the ἄκαπνα ξύλα. To conclude: The very dead leaves afford, like thoſe of the Elm, relief to our cattle in winter; and there is a dwarf ſort in France, (if in truth it be not, as I ſuſpect, our Witchen-tree) whoſe berries feed the poor people in ſcarce years; but it bears no keys like to ours, which, being pickled tender, afford a delicate ſallading: But the ſhade of the Aſh is not to be endured, becauſe the leaves produce a noxious inſect; and for diſplaying themſelves ſo very late, and falling very early, not to be planted for umbrage or ornament, eſpecially near the garden, ſince, beſides their predatious roots, the leaves dropping with ſo long a ſtalk, are drawn by cluſters into the worm-holes, which foul the alleys with their keys, and ſuddenly infect the ground. Note, that the ſeaſon for felling of this tree muſt be when the ſap is fully at reſt; for if you cut it down too early, or over late in the year, it will be ſo obnoxious to the worm, as greatly to prejudice the timber; therefore to be ſure, fell not but in the three mid-winter months, beginning about November. But in lopping of Pollards, as of ſoft woods, Mr. Cook adviſes it ſhould be towards the ſpring, and that you do not ſuffer the lops to grow too great; alſo, that ſo ſoon as a Pollard comes to be conſiderably hollow at the head, you ſuddenly cut it down, the body decaying more than the head is worth: The ſame he pronounces of taller Aſhes, and where the wood-peckers make holes (who conſtantly indicate their being faulty) to fell it in winter. I am aſtoniſhed at the univerſal confidence of ſome, that a ſerpent will rather creep into the fire than over a twig of Aſh; this is an old impoſture of Pliny, who either took it upon truſt, or we miſtake the tree. For other ſpecies, ſee Raii Dendrolog. tom. iii. lib. xxx. p. 95. De Fraxino, tom. ii. p. 1704.

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when the weather is very dry and warm, make an oblong inciſion, and take off from the bark of the tree about three inches in length and two in breadth; they leave the wound open, and by degrees the manna runs out, and is almoſt ſuddenly thickened to its proper conſiſtence, and is found adhering to the bark of the tree. This manna is collected in baſkets, and goes under the name of *Manna Graſſa*. When the people want to have a very fine manna, they apply to the inciſion of the bark thin ſtraw, or ſmall bits of ſhrubs, ſo that the manna, in coming out, runs upon theſe bodies, and is collected in a ſort of regular tubes, which give it the name of *Manna in cannoli*; that is, manna in tubes. This kind is always preferred to the other, becauſe it is free and clear."

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The Chesnut Tree

J. C. Miller del. & Sc.

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CHAP. VIII.

The CHESNUT*.

CH. VIII.

1. CASTANEA, the Cheſnut. Of this Pliny reckons many kinds, eſpeciallya bout Tarentum and Naples; but we commend thoſe of Portugal or Bayonne, chooſing the largeſt, browneſt, and moſt ponderous for fruit, ſuch as Pliny calls Coctivæ, but the leſſer ones for raiſing timber. They are produced beſt by ſowing and ſetting: previous to which, let the nuts be firſt ſpread to ſweat, then cover them in ſand: a month being paſt, plunge them in water and reject the ſwimmers: being dried for thirty days more, ſand them again, and to the water-ordeal as before. Being thus treated till the beginning of ſpring, or in November, ſet them as you would do beans; and, as ſome practiſe it, drenched, for a night or more, in new milk: But without half this preparation they need only be put into the holes with the point upmoſt, as you plant Tulips. Pliny will tell you, they come not up, unleſs four or five be piled together in a hole, but that is falſe, if they they be good, as you may preſume all thoſe to be

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* Dr. Linnæus has, with great botanical propriety, made the Cheſnut a ſpecies of Fagus; but as Mr. Evelyn and others have conſidered them as ſeparate, I think I ſhall be more generally underſtood by retaining the old diſtinction.——The ſpecies are,

1. CASTANEA *(Sativa)* foliis lanceolatis acuminato-ſerratis, ſubtus nudis. *Cheſnut with ſpear-ſhaped leaves, which are ſharply ſawed, and naked on their under ſide.* Caſtanea ſativa. C. B. P. 418. *The manured Cheſnut.*

This beautiful tree deſerves to be ranked with timber-trees of the firſt claſs, whether we conſider its ornamental apppearance when growing, or its uſes when felled. The leaves are large, of a pleaſant green colour, and in the autumn turn to a golden yellow; ſo that in that declining ſeaſon, amongſt the different tinges in a wood, this is very conſpicuous, and makes an agreeable contraſt. If theſe trees are planted in large wilderneſs quarters next the walks, or in woods by the ſide of the ridings, and are left untrimmed, as they ought to be, they will be feathered to the bottom, and not only make a beautiful appearance, but all the ſummer will hide thoſe naked and crooked ſtems of other trees, in the plantations and woods, which are always eſteemed diſagreeable objects. This tree was formerly cultivated in this iſland in greater quantities than at preſent; and appears to have been the chief timber, in earlier times, uſed for building.——It were greatly to be wiſhed, that the ancient ſpirit of propagating the Cheſnut could be revived, as the timber is excellent in its kind, being as valuable as the Oak, and in many reſpects ſuperior to it; like that King of our woods, (for this title the Oak muſt

Book I. which paſs the examination, nor will any of them fail; but being come up, they thrive beſt unremoved, making a great ſtand for at leaſt two years upon every tranſplanting; yet if needs you muſt alter their ſtation, let it be done about November, and that into a light friable ground, or moiſt gravel; however they will grow even in clay, ſand, and all mixed ſoils, upon expoſed and bleak places, and the pendent declivities of hills to the north, in dry airy places, and ſometimes, though not ſo well, near marſhes and waters; but they affect no other compoſt, ſave what their own leaves afford them, and are more patient of cold than heat. As for their ſowing in the nurſery, treat them as you are taught in the Walnut.

2. If you deſign to ſet them in winter or autumn, I counſel you to inter them within their huſks, which, being every way armed, are a good protection againſt the mouſe, and a providential integument. Pliny, lib. xv. cap. xxiii. from this natural guard, concludes them to be excellent food;

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ſtill retain) it yields the induſtrious planter an annual crop. The nuts of this tree are equally well liked by the deer, and by ſwine are even preferred to the acorn.——The uſes of the timber of this tree, like that of the Oak, are almoſt univerſal. It is not only excellent for all ſorts of buildings, but it is alſo ſerviceable for mill-timber and water-works; ſo that if pipes bored of this wood lie conſtantly under ground, they will endure longer than the Elm.——Of the Cheſnut are made very fine tables, ſtools, chairs, cheſts, and bedſteads. It is preferred for the making all ſorts of tubs and veſſels to hold liquor; and in this reſpect it is ſuperior to the Oak; becauſe, when once thoroughly ſeaſoned, it is not ſubject either to ſhrink or ſwell, but will conſtantly maintain an equal magnitude of bulk; and for this reaſon the Italians make their caſks and tuns for wine of this wood. For ſmaller purpoſes it has its ſuperior advantages: Poles of this tree for hops, vines, &c. will laſt longer than of any other; and ſtakes of the under-wood will laſt nearly twice as long as thoſe of any other ſort.

2. Castanea *(Pumila)* foliis lanceolato-ovatis acutè ſerratis, ſubtus tomentoſis, amentis filiformibus nodoſis. Gron. Virg. 150. *Cheſnut with oval ſpear-ſhaped leaves ſharply ſawed, which are woolly on their under ſide, and a ſlender knotted katkin.* Caſtanea pumila Virginiana, racemoſo fructu parvo in ſingulis capſulis echinatis unico. Pluk. Alm. 90. *The Chinquapin.*

The Chinquapin, or Dwarf Virginian Cheſnut, is at preſent very rare in England: it is very common in the woods of America, where it ſeldom grows above twelve or fourteen feet high, and produces great plenty of nuts, which are, for the moſt part, ſingle in each outer coat or capſule. This tree is very hardy, and will reſiſt the ſevereſt of our winters in the open ground, but is very apt to decay in ſummer, eſpecially if it is planted in very dry ground. The nuts of theſe trees, if

and doubtleſs Cæſar thought ſo, when he tranſported them from Sardis firſt into Italy, whence they were propagated into France, and thence among us; another encouragement to make ſuch experiments out of foreign countries. Some ſow them confuſedly in the furrow like the acorn, and govern them as the Oak; but then ſhould the ground be broken up betwixt November and February; and when they ſpring, be cleanſed and thinned two feet aſunder, after two years growth: Likewiſe may copſes of Cheſnuts be wonderfully increaſed and thickened, by laying the tender and young

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brought from America, ſhould be put up in ſand as ſoon as they are ripe, and ſent to England immediately, otherwiſe they loſe their growing quality, which is the reaſon this tree is at preſent ſo ſcarce with us; for not one ſeed in five hundred ſent over ever grows, owing to the neglect of putting them up in this manner: Indeed, moſt of the nuts which have been brought over, have been kiln-dried, to preſerve them from ſprouting, which infallibly deſtroys the germen. When the nuts arrive, they ſhould be put into the ground as ſoon as poſſible; and if the winter ſhould prove ſevere, it will be proper to cover the ground with leaves, tan, or peaſe-haulm, to prevent the froſt from penetrating the ground, ſo as to deſtroy the nuts. This ſort of Cheſnut delights in a moiſt ſoil; but if the wet continues long upon the ground in winter, it is apt to kill the trees. This will take by inarching it upon the common ſort, but the trees ſo propagated ſeldom ſucceed well.

In the ſyſtem of Linnæus the Cheſnut is ranked in the claſs and order *Monoecia Polyandria*. The male flowers are collected in long catkins, and begin to open about the ninth of May. The buds uſually appear about the fourteenth of April, and in ſix or ſeven days after the leaves will be quite out, and remain green till the twelfth of October, when they aſſume a fine yellow colour.

The culture of this tree is as follows: Having provided a ſufficient quantity of nuts, throw them into water, to know whether they are ſound and good; the ſound ones will ſink to the bottom, whilſt the others will ſhew themſelves to be faulty by ſwimming. This method ſhould be always practiſed, that you may be certain of your ſeeds, whether they are of Engliſh or foreign growth. Indeed, in ſome cold damp ſoils, Cheſnut-trees ſeldom perfect their ſeeds here; but where they do, our Engliſh trees produce very good ſeeds for the purpoſe; though it is generally allowed that thoſe brought from Portugal and Spain are better.

The goodneſs of the nuts being thus proved, and having a ſufficient quantity of ground properly prepared for the ſeminary, in the month of February let drills, about a foot diſtance from each other, be made acroſs this ground, about four inches deep, in which let the nuts be placed, at about four inches diſtance, throughout every drill. Some people recommend the eye of the nut to be placed uppermoſt, but there ſeems

BOOK I. branches; but ſuch as ſpring from the nuts and marrons are beſt of all, and will thrive exceedingly, if (being let ſtand without removing) the ground be ſtirred, and looſened about their roots for two or three of the firſt years, and the ſuperfluous wood pruned away; and indeed for good trees, they ſhould be ſhriped up after the firſt year's removal; they alſo ſhoot into gallant poles from a felled ſtem: Thus will you have a copſe ready for a felling, within eight years, which, beſides many other uſes, will yield you incomparable poles for any work of the garden, vineyard, or hop-yard, till the

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no neceſſity for ſuch a caution; nature in all caſes of ſowing puſhes the germ upwards and the root downwards; and if we were, by way of experiment, to turn the germ of a new-ſprouted bean downwards and the root upwards, the plant, from a kind of vegetable inſtinct impreſſed upon it by the Author of Nature, would counteract our intentions, and in a few days the germ and root would reaſſume their former poſitions.

In the ſpring, when the young plants appear, they ſhould be kept clear from weeds; and as often as any weeds preſent themſelves, they muſt be plucked up during the time the trees remain in the ſeminary, which ought to be two years from the time of ſowing.

A ſeminary of theſe trees, planted in this manner, ſhould always be hand-weeded, becauſe, being pretty near each other, it would be dangerous to introduce a hoe among them, for fear of hurting the tender rind, which would greatly injure the plants ſo wounded.——The plants, having ſtood in the ſeminary two years, muſt be carefully taken up, all the ſide-ſhoots taken off, and the tap-root ſhortened; then, having ground in the nurſery double dug, let them be planted in this ground in rows, which ſhould be two feet and a half or three feet aſunder, and ſet them at leaſt one foot and a half diſtant in theſe rows. The beſt time for doing this work will be the latter end of February; for if they are planted in October, the ſevere froſts will be ſubject to throw the young plants out of the ground before winter is over. A year after they have been planted in the nurſery, it will be very proper to cut every one of them down to within an inch of the ground; which will cauſe them to ſhoot vigorouſly with one ſtrong and ſtraight ſtem. Without this treatment, they are very ſubject to grow ſcraggy and crooked, and to make but ſlow progreſs; ſo that where they do not take well to the ground, and ſhoot irregularly, they ſhould be cut down according to this direction; after which they will ſhoot ſtrongly, and overtake thoſe that never underwent this operation, though planted ſome years before them, in a very ſhort time.

In this nurſery they may remain four or five years, when they will be fit to plant out, with no other pruning than taking off very ſtrong ſide-branches, and ſuch as have a tendency to make the tree forked. The only trouble the ground will occaſion, will be keeping it clear of weeds, and every winter digging between the rows.—After they are of a ſufficient ſize to be planted out for ſtandards, either in fields, clumps, wilderneſs quarters, or avenues, they ſhould be carefully taken out of the nurſery; and having holes dug three feet ſquare, and a foot and a half deep, with the turf chopt ſmall

next cutting; and if the tree like the ground, it will, in ten or twelve years, grow to a kind of timber, and bear plentiful fruit.

3. I have ſeen many Cheſnut-trees tranſplanted as big as my arm, their heads cut off at five and ſix feet height, but they came on at leiſure. In ſuch plantations, and all others for avenues, you may ſet them from thirty to ten feet diſtance, though they will grow much nearer, and ſhoot into poles, if, being tender, you cultivate them like the Aſh, the nature of

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at the bottom of each hole, and all the bruiſed parts of the roots taken off, the fineſt mould ſhould cover the fibres; obſerving always to plant them no deeper than the ſurface of the ſoil. After this, they may be turfed round to keep them ſteady againſt the winds. The beſt month for this work is October.

When theſe trees are deſigned for timber, they ſhould remain unremoved; but where the fruit of them is more ſought after, then it is certainly the better way to tranſplant them: for as tranſplanting is a check to the luxuriant growth of trees, ſo it is a promoter of their fructification, as may be evinced by obſerving low ſhrubby Oaks, Walnuts, &c. which generally have a greater plenty of fruit than any of the larger and more vigorous; and the fruit of ſuch trees is much ſuperior in taſte, tho' the ſeeds of vigorous trees are vaſtly preferable for plantations of timber: for it is a conſtant obſervation, that, by ſaving ſeeds from dwarf trees or plants, from time to time, they may be rendered much lower in their growth than is their natural ſize; but where the fruit is moſt deſired, then they ſhould be taken from ſuch trees as produce the largeſt and ſweeteſt nuts, which are commonly found upon ſuch trees as ſpread the moſt, and have horizontal roots; for the weaker trees being leſs capable to furniſh a ſupply of nouriſhment, and having a greater quantity of fruit upon them, to which this muſt be diſtributed, together with their roots lying near the ſurface of the ground, (by which means the juices are better prepared by the ſun, air, &c. before it enters their veſſels) it is certain their juices are better digeſted, and their fruits better maturated, than thoſe can poſſibly be, which grow upon ſtrong vigorous trees, which have long tap-roots running ſeveral feet deep into the earth, and conſequently take in vaſt quantities of crude unprepared juices.

If you deſign a large plantation of theſe trees for timber, after having two or three times plowed the ground, the better to deſtroy the roots of weeds, you ſhould make your furrows about ſix feet diſtance from each other, in which you ſhould lay the nuts about ten inches aſunder, covering them with earth about three inches deep; and, when they come up, you muſt carefully clear them from weeds: the diſtance allowed between each row, is for the uſe of the horſe-hoeing plow, which will diſpatch a great deal of this work in a ſhort time; but it ſhould be performed with great care, ſo as not to injure the young plants; therefore the middle of the ſpaces only ſhould be cleaned with this inſtrument, and a hand-hoe muſt be uſed to clean between the plants in the rows, and alſo on each ſide, where it will be unſafe for the plow to be drawn: and in

Book I. whoſe ſhade it reſembles, ſince nothing affects much to grow under it. Some huſbands tell me, that the young Cheſnut-trees ſhould not be pruned or touched with any knife or edge-tool for the firſt three or four years, but rather cropped or broken off, which I leave to farther experience; however, many forbear to top them when they tranſplant.

4. The Cheſnut being graffed on the Walnut, Oak, or Beech, I have been told, will come exceeding fair, and produce incomparable fruit; for

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hand-hoeing, there muſt be great care taken not to cut the tender rind of the plants. If the following ſpring the ſpaces are carefully ſtirred with the plow, it will not only make the ground clean, but alſo looſen it, ſo as that the ſun and moiſture may more eaſily penetrate the ſame, which will greatly promote the growth of the plants; and the oftener theſe plowings are repeated, the cleaner will be the ground, and the greater will be the progreſs of the plants, which cannot be kept too clean while they are young. When theſe have remained three or four years, if the nuts ſucceed well, you will have many of theſe trees to remove, which ſhould be done at the ſeaſons before directed, leaving the trees diſtant about three feet in the rows; at which diſtance they may remain for three or four years more, when you ſhould remove every other tree to make room for the remaining ones, which will reduce the whole plantation to ſix feet ſquare, which will be diſtance enough for them to remain in, until they are large enough for poles, when you may cut down every other of theſe trees (making choice of the leaſt promiſing) within a foot of the ground, in order to make ſtools for poles, which, in eight or ten years time, will be ſtrong enough to lop for hoops, hop-poles, &c. for which purpoſes they are preferable to moſt other trees; ſo that every tenth year there will be a freſh crop, which will pay the rent of the ground, and all other incumbent charges, and, at the ſame time, a full crop of growing timber will be left upon the ground: but as the large trees increaſe in bulk, their diſtance of twelve feet ſquare will be too ſmall; therefore when they have grown to a ſize for ſmall boards, you ſhould fell every other tree, which will reduce them to twenty-four feet ſquare, which is a proper diſtance for them to remain for good; this will give air to the under-wood (which, by this time, would be too much overhung by the cloſeneſs of the large trees); by which means that will be greatly encouraged, and the fall of the ſmall timber will pay ſufficient intereſt for the money at firſt laid out in planting, &c. with the principal alſo: ſo that all the remaining trees will be clear profit, as the under-wood, ſtill continuing, will pay the rent of the ground, and all other expences.

I have here ventured to recommend the raiſing a wood of Cheſnut-trees from the nut, by the authority, and in the words of Mr. Miller; but Mr. Hanbury contends that it is much better to plant ſuch a wood from the nurſery. He ſays, "Where a wood of theſe trees is wanted, they ſhould be raiſed in the nurſery way; and when the plants are about five feet high, they will be of the propereſt ſize for the purpoſe; for they will then not be ſo large as to require ſtaking, nor yet ſo ſmall but that they will be out of

the Walnut and Cheſnut on each other, it is probable, but I have not yet made a full attempt. They alſo ſpeak of inoculating Cherries on the Cheſnut-ſtock for a later fruit. In the mean time, I wiſh we did more univerſally propagate the Horſe-Cheſnut, which, being eaſily increaſed from layers, grows into a goodly ſtandard, and bears a moſt glorious flower, even in our cold country. This tree, ſo called from its curing horſes broken-winded, and other cattle of coughs, is now all the mode for the avenues to their country palaces in France, as appears by the late Superintendant's plantation at Vaux. It was firſt brought from Conſtantinople to Vienna,

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the reach of hares, rabbits, &c. Therefore, as ſoon as the trees are about this height in the nurſery, let the ground deſigned for the wood be plowed deep with a very ſtrong plow, that the uppermoſt and the beſt part of the ſoil may be laid as low as poſſible, to be of greater nouriſhment to the tree, when it receives its tender fibres. The diſtance theſe trees ſhould be planted from one another ought to be two yards; and this will be a proper diſtance for them to grow up to poles; when they ſhould be cut down, only leaving a ſufficient number of the beſt and moſt thriving trees for timber. Thus, whilſt the latter are making their progreſs to a larger bulk, being left at a diſtance of near twenty feet, the poles will, at the interval of fourteeen years from the firſt planting, reward the owner's toils with no inconſiderable profits; and if they are cut down within about a foot of the ground, there will be ſtools for another crop of poles, which will be ready for a ſecond cutting in about ten years: ſo that every ten years the planter will taſte the ſweets of his labour, while his expectations are ſtill augmented, as to the advantage of his family in after-times. If the plantation is large, I would adviſe to begin the firſt fall of poles ſo early, and to defer the latter ſo late, that the year after the laſt fall the ſtools of the firſt-cut poles ſhall have ſent forth poles ready for a ſecond cutting. Thus the proprietor will not only enjoy the benefits of an annual ſale, but the country will not be glutted with too great a quantity of poles at a time, and conſequently they may be ſold at a better price.

"Such are the directions I would give for raiſing a wood of theſe trees; which I take to be better than planting the nuts, and letting them remain; not only becauſe the plant is then ſubject to a tap-root, which ſtrikes directly into the ground beyond the reach of nouriſhment, and conſequently muſt in proportion grow ſlower, but alſo becauſe the expences will be leſs. While they are in the nurſery, a vaſt quantity of them will ſtand upon a ſmall ſpace of ground, and conſequently be raiſed at a ſmall expence; but when the nuts are planted with a deſign to remain, the whole extent of the ground intended for the wood muſt be kept clear of weeds till the plants are grown of a ſufficient ſize to defend themſelves." *Body of Planting*, *p.* 14.

The Cheſnut will thrive on almoſt all ſoils and in all ſituations. It will grow beſt, indeed, in a rich loamy land; but it will ſucceed very well on that which is gravelly, clayey, or ſandy. All mixed ſoils are ſuitable to it, as well as expoſed places, and the declivities of hills.

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thence into Italy, and ſo to France; but to us from the Levant more immediately, and flouriſhes ſo well, and grows ſo goodly a tree in competent time, that, by this alone, we might have ample encouragement to denizen other ſtrangers amongſt us. One inconvenience to which this beautiful tree is obnoxious, is, that it does not well reſiſt impetuous and ſtormy winds without damage *.

5. The Cheſnut is, next the Oak, one of the moſt ſought after by the Carpenter and Joiner. It hath formerly built a good part of our ancient houſes in the City of London, as does yet appear. I had once a very large barn near the city, framed intirely of this timber; and certainly

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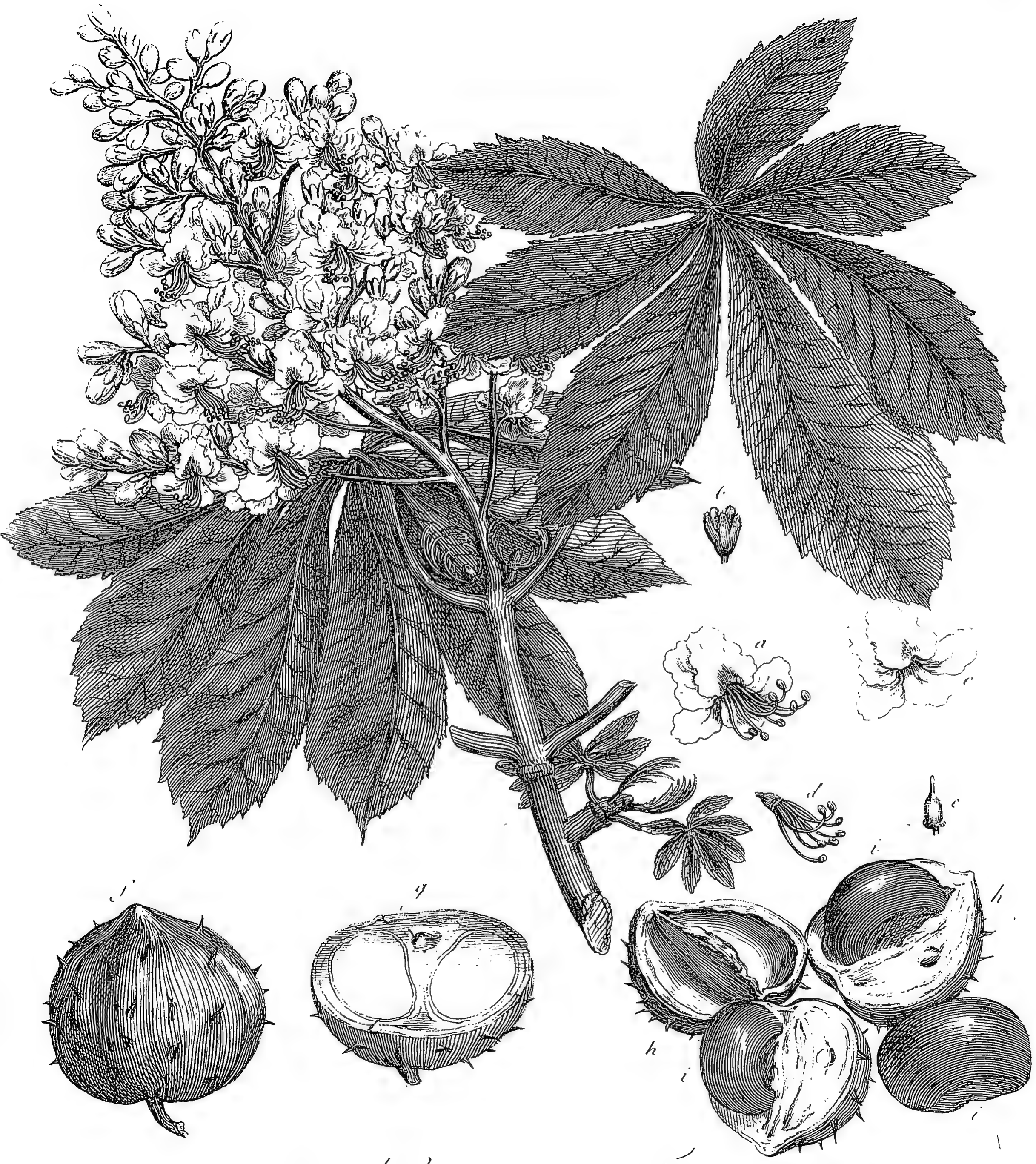
* The Horſe-Cheſnut is a tree of ſingular beauty and uſe; the leaves are large, fine, and palmated, and appear very early in the ſpring. It is naturally uniform in its growth, forming its head, if left to nature, into a regular parabola. In the ſpring it produces long ſpikes of beautiful flowers; and although in the autumn its leaves fall off pretty early, it makes amends by exhibiting its nuts of a bright brown colour, ſome on the ground, ſome ready to fall, and others juſt peeping out of their cells.

This tree is a native of the Eaſt, and is ſaid to have been brought into Europe in 1610; at which time alſo the Laurel was introduced into the Engliſh gardens: But we have reaſon to believe that this tree was brought from Conſtantinople, and made a denizen of England, almoſt an hundred years before the above-mentioned period.

This tree is very proper to be planted for avenues or walks; though I know it has been objected by ſome, that its leaves fall early in the autumn: But it ſhould be conſidered that it ſhoots out proportionably earlier in the ſpring, which, together with its beautiful flowers, makes it an ornamental and deſirable tree.

The Horſe-Cheſnut-tree is extremely well adapted to parks; not only becauſe it grows to a large ſize, and forms a beautiful regular head, thereby at a diſtance ſtriking the imagination with a pleaſing ſurprize, but on account of the quantity of nuts it produces, which are excellent food for deer in the rutting ſeaſon: So that in parks where great numbers of deer are kept, I would recommend theſe trees to be planted in abundance. They are likewiſe very proper for the boundaries of open fields, to terminate views, &c. and though there are no deer to eat the nuts, yet the ſwine are equally delighted with them, and will fatten greatly with ſuch provender.

The buds of this tree, before they ſhoot out leaves, become turgid and large; ſo that they have a good effect to the eye, by their bold appearance, long before the leaves appear: And what is peculiar to the Horſe-Cheſnut is, that as ſoon as the leading ſhoot is come out of the bud, it continues to grow ſo faſt, as to be able to form its whole ſummer's ſhoot in about three weeks or a month's time. After this it grows little or nothing more in length, but thickens, and becomes ſtrong and woody, and forms the buds for the next year's ſhoot. The flowers are in full blow about the twelfth of May, and on fine trees make a pleaſing appearance. They have ſeven



The Horse Chesnut Tree.

J. Miller del. Sculp.

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the trees grew not far off, probably in ſome woods near the town; for, in that deſcription of London, written by Fitz-Stephens, in the reign of Henry II. he ſpeaks of a very noble and large foreſt which grew on the boreal part of it; *Proxime*, ſays he, *patet foreſta ingens, ſaltus nemoroſi ferarum, latebræ cervorum, damarum, aprorum, & taurorum ſylveſtrium*, &c. A very goodly thing it ſeems, and as well ſtored with all ſorts of good timber as with veniſon and all kind of chaſe; and yet ſome will not allow the Cheſnut to be a freeborn of this Iſland, but of that I make little doubt *. The Cheſnut affords the beſt ſtakes and poles for paliſades, pedaments

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ſtamina and one ſtyle, which ſhews the tree to be of the claſs and order *Heptandria Monogynia*. Sir Charles Linnæus has altered the old title to that of *Eſculus*.

This tree is propagated from the nut: In autumn, therefore, when the nuts fall, a ſufficient quantity ſhould be gathered. Some people recommend them to be ſown immediately in drills; but others, with more propriety, delay the ſowing till the ſpring, by which means they will eſcape the ravages of the field-mouſe. Previous to ſowing they ſhould be thrown into water, as directed in page 48, which will ſecure to the planter the certainty of a crop.

In the ſpring the plants will come up; and when they have ſtood one year they may be taken up, their tap-roots ſhortened, and afterwards planted in the nurſery, and managed in the ſame manner as was directed for the Spaniſh Cheſnut.

When they are of ſufficient ſize to be planted out for good, they muſt be taken out of the nurſery with care, the great ſide-ſhoots and the bruiſed parts of the roots ſhould be taken off, and then planted in large holes level with the ſurface of the ground, at the top of their roots, the fibres being all ſpread and lapped in the fine mould, and the turf alſo worked to the bottom. A ſtake ſhould be placed to keep them ſafe from the winds, and they muſt be fenced from the cattle till they are of a ſufficient ſize to defend themſelves. The beſt ſeaſon for this work is October.——After the trees are planted, neither knife nor hatchet ſhould come near them; but they ſhould be left to Nature to form their beautiful parabolic heads, and aſſume their utmoſt beauty.

The Horſe-Cheſnut, like moſt other trees, delights moſt in good fat land; but it will grow exceeding well on clayey and marly grounds. I have ſeen large trees, luxuriant and healthy, in very cold, barren, and hungry earth. In ſhort, it is not very nice in its diet, but may be planted in moſt places to the owner's ſatisfaction. It grows to a large ſize in a few years.

* In the ſixty-firſt volume of the Philoſophical Tranſactions, Dr. Ducarel very learnedly oppoſes the opinion of the Hon. Mr. Daines Barrington, who, in the fifty-ninth volume of the ſame work, had aſſerted that "Cheſnut-trees were not natives of this kingdom."——The arguments produced by the Doctor appear to me ſufficiently concluſive in favour of theſe trees being indigenous.

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for vine-props and hops, as I ſaid before. It is good for mill-timber or water-works, or where it may lie buried; but if water touch the roots of the growing trees, it ſpoils both fruit and timber. It is likewiſe obſerved, that this tree is ſo prevalent againſt cold, that, where they ſtand, they defend other plantations from the injuries of the ſevereſt froſts. I am ſure, being planted in hedge-rows, *& circa agrorum itinera*, or for avenues to our country houſes, they are a magnificent and royal ornament. This timber alſo does well, if kept dry, for columns, tables, cheſts, chairs, ſtools, bedſteads; for tubs and wine-caſks, which it preſerves with the leaſt tincture of the wood of any whatſoever. If the timber be dipped in ſcalding oil, and well pitched, it becomes extreamly durable, but, otherwiſe, I cannot celebrate the tree for its ſincerity, it being found that, contrary to the Oak, it will make a fair ſhew outwardly when it is all decayed and rotten within; but this is in ſome ſort recompenſed, if it be true that the beams made of Cheſnut-tree have this property, that, being ſomewhat brittle, they give warning and premoniſh the danger by a certain crackling, ſo as, it is ſaid, to have frighted thoſe out of the baths at Antandro, whoſe roof was laid with this material, but which, Pliny ſays, was of Hazel, very unlike it. Formerly they made conſultary ſtaves of this tree; and the variegated rods which Jacob peeled to lay in the troughs, to impreſs a fancy in his Father-in-law's conceiving ewes, are ſaid to have been of this material. The coals are excellent for the ſmith, being ſoon kindled, and as ſoon extinguiſhed; but the aſhes of Cheſnut-wood are not convenient to make a lee with, becauſe it is obſerved to ſtain the linen. As for the fruit, it is better to beat it down from the tree ſome little time before they fall off themſelves; thus they will the better keep, or elſe you muſt ſmoak-dry them. But we give that fruit to our ſwine in England, which is amongſt the delicacies of Princes in other countries, and, being of the larger nut, is a luſty and maſculine food for ruſticks at all times, and of better nouriſhment for huſbandmen than cole and ruſty bacon, yea, or beans to boot; inſtead of which, they boil them in Italy with their bacon; and, in Virgil's time, they eat them with milk and cheeſe *. The beſt tables in France and Italy make them

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* Tityrus, in his invitation to Melibœus, ſays,

——— Sunt nobis mitia poma,
Caſtaneæ molles, et preſſi copia lactis. Ecl. i.

Cheſnuts are a very harſh food, ſo that ſome underſtand by *Caſtaneæ molles* roaſted Cheſnuts. Pliny ſays, "Torrere has in cibis gratius."

a ſervice, eating them with ſalt, in wine, or juice of lemon and ſugar, being firſt roaſted on embers on the chaplet; and, doubtleſs, we might propagate their uſe among our common people, as of old the Βαλανοφάγοι, being a food ſo cheap, and ſo laſting. In Italy they alſo boil them in wine, and then ſmoak them a little; theſe they call anſeri or geeſe, I know not why. Thoſe of Piemont add fennel, cinnamon and nutmeg to their wine: if in water, they mollify them with the vapour only, but firſt they peel them; others macerate them in roſe-water. The bread of the flour is exceeding nutritive; it is a robuſt food, and makes women well complexioned, as I have read in a good author. They alſo make fritters of Cheſnut flour, which they wet with roſe-water, and ſprinkle with grated parmigiano, and ſo fry them in freſh butter for a delicate. How we here uſe Cheſnuts in ſtewed meats and beatille pies, our French Cooks teach us; and this is in truth their very beſt uſe, and very commendable; for it is found that the eating of them raw, or in bread, as they do much about Limoſin, is apt to ſwell the belly, though without any other inconvenience that I can learn; and yet ſome condemn them as dangerous for ſuch as are ſubject to the gravel in the kidneys; and however cooked and prepared, flatulent, offenſive to the head and ſtomach, eſpecially to thoſe who are ſubject to the cholick. The beſt way to preſerve them, is to keep them in earthen veſſels in a cold place; ſome lay them in a ſmoak-loft, others in dry barley-ſtraw, others in ſand, &c. The leaves of the Cheſnut-tree make very wholeſome mattreſſes to lie on, and they are good litter for cattle: But thoſe leafy-beds, for the crackling noiſe they make when one turns upon them, the French call *lits de parlement*. Laſtly, the flour of Cheſnuts, made into an Electuary, and eaten with honey faſting, is an approved remedy againſt ſpitting of blood, and the cough: And a decoction of the rind of the tree, tinctures hair of a golden colour, eſteemed a beauty in ſome countries. For other ſpecies, vide Raii Dendrolog. tom. iii.

CHAP. IX.

The WALNUT *.

Book I.

† Macrob. Saturn. Lib. ii. cap. xiv.

1. JUGLANS, *quaſi Jovis glans* †, the Wall, or Welch, Nut is of ſeveral ſorts, the ſoft ſhell and the hard, the whiter and the blacker grain; the black bears the worſt nut, but the timber is much to be preferred, and we might propagate more of them if we were careful to procure them out of Virginia, where they abound and bear a ſquarer nut, of all others the moſt beautiful and beſt worth planting: Indeed, had we ſtore of theſe, we ſhould ſoon deſpiſe the reſt; yet thoſe of Grenoble come in the next place, and are much prized by our cabinet-makers. At all events, be ſure to plant from young and thriving trees, bearing full and plump kernels. It is ſaid that the Walnut kernel wrapped in its own leaf, being carefully taken out of its ſhell, brings a nut without ſhell; but this is a trifle. The beſt way to elevate them, is to ſet them as you do the Cheſ-

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* Formerly the Walnut-tree was much propagated for its wood; but ſince the importation of Mahogany and the Virginia Walnut, it has conſiderably decreaſed in reputation. Mr. Miller enumerates ſix ſpecies of this tree.

1. JUGLANS *(Regia)* foliolis ovalibus glabris ſubſerratis ſubæqualibus. Hort. Cliff. 449. *Walnut with oval ſmall leaves or lobes, which are ſmooth, ſawed, and equal.* Nux juglans ſive Regia vulgaris. C. B. P. 417. *Common Walnut.*

Of the common Walnut there are ſeveral varieties, which are diſtinguiſhed by the following titles: the large Walnut, the thin-ſhelled Walnut, the French Walnut, the late-ripe Walnut, and the double Walnut; but theſe do all of them vary when raiſed by the ſeed, ſo that the nuts from the ſame tree will produce plants whoſe fruit will differ; therefore there can be no dependence upon the trees which are raiſed from nuts, till they have produced fruit; ſo that thoſe perſons who plant the trees for their fruit, ſhould make choice of them in the nurſeries when they have their fruit upon them, otherwiſe they may be deceived, by having ſuch as they would not chooſe.

2. JUGLANS *(Nigra)* foliolis quindenis lanceolatis ſerratis, exterioribus minoribus, gemmulis ſuper axillaribus. Hort. Cliff. 449. *Walnut-tree with ſpear-ſhaped lobes which are ſharply ſawed, the middle being the largeſt.* Nux juglans Virginiana nigra. Cateſb. Car. *Black Virginia Walnut.*

This grows to a large ſize in North America. The leaves are compoſed of five or ſix pair of ſpear-ſhaped lobes, which end in acute points, and are ſawed on their



The Wallnut Tree

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nut, being planted of the nut, or ſet at the diſtance you would have him ſtand; for which they may be prepared by beating them off the tree, as was preſcribed of the Cheſnut, ſome days before they quit the branches of themſelves, and keeping them in their huſks, or without them, till ſpring, or by bedding them, being dry, in ſand or good earth, till March or earlier, from the time they fell, or were beaten off the tree: But if before, they ſhould be ſet with huſks and all upon them; for the extreme bitterneſs thereof is moſt exitial and deadly to worms; or it were good to ſtrew ſome furzes, broken or chopped ſmall, under the ground amongſt them, to preſerve them from mice and rats, when their ſhells begin to wax tender; eſpecially if, as ſome, you ſupple them a little in warm cow's milk; but being treated as before, you will find them already ſprouted, and have need only to be planted where they are to abide; becauſe, as we ſaid long ſince, they

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edges; the lower pair of lobes are the leaſt, the other gradually increaſe in their ſize to the top, where the pair at the top, and the ſingle lobe which terminates the leaf, are ſmaller; theſe leaves, when bruiſed, emit a ſtrong aromatic flavour, as do alſo the outer cover of the nuts, which are rough, and rounder than thoſe of the common Walnut. The ſhell of the nut is very hard and thick, and the kernel ſmall, but very ſweet.

3. JUGLANS *(Oblonga)* foliolis cordato-lanceolatis infernè nervoſis, pediculis foliorum pubeſcentibus. *Walnut with heart ſpear-ſhaped lobes, having many veins on their under ſide, and downy foot-ſtalks to the leaves.* Juglans nigra, fructu oblongo profundiſſime inſculpto. Hort. Chelſ. *Black Virginia Walnut, with an oblong fruit very deeply furrowed.*

This ſort grows naturally in North America, where the trees grow to a large ſize. The leaves are compoſed of ſeven or eight pair of long heart-ſhaped lobes, broad at their baſe, where they are divided into two round ears, but terminate in acute points; they are rougher, and of a deeper green than thoſe of the ſecond ſort, and have nothing of the aromatic ſcent which they have. The fruit is very long. The ſhell is deeply furrowed, and is very hard. The kernel is ſmall, but well flavoured.

4. JUGLANS *(Alba)* foliolis lanceolatis ſerratis, exterioribus latioribus. Lin. Sp. Plant. 997. *Walnut with ſpear-ſhaped ſawed lobes, the outer being the broadeſt.* Nux juglans alba Virginienſis. Park. Theat. 1414. *White Virginia Walnut called Hickery Nut.*

This is very common in moſt parts of North America, where it is called Hickery Nut. The leaves are compoſed of two or three pair of oblong lobes, terminated by an odd one; theſe are of a light green, and ſawed on their edges; the lower

Book I. are moſt impatient of tranſplanting: However, if there be an abſolute neceſſity of removing, let your tree never be above four years old, and then by no means touch the head with your knife, nor cut away ſo much as the very tap-root, being ſo old, if you can well diſpoſe of it, ſince being of a pithy and hollow ſubſtance, the leaſt diminution, or bruiſe, will greatly endanger the killing: But ſee here what we have ſaid of the Cheſnut. I have been told, that the very tops and paliſh buds of this tree, when it firſt ſprouts, though as late as April, will take hold of the ground, and grow to an incredible improvement; but firſt they ſteep them in milk and ſaffron: however this attempt did not ſucceed with us, yet it may be propagated by a branch ſlipped off with ſome of the old wood, and ſet in February.

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pair of lobes are the ſmalleſt, and the upper the largeſt. The fruit is ſhaped like the common Walnut; but the ſhell is not furrowed, and is of a light colour.

5. JUGLANS *(Glabra)* foliolis cuneiformibus ſerratis, exterioribus majoribus.. *Walnut with wedge-ſhaped lobes which are ſawed, the outer being the largeſt.* Juglans alba fructu minori cortice glabro. Clayt. Flor. Virg. *White Walnut with a ſmaller fruit, and a ſmooth bark.*

This ſort is not ſo large as the laſt. The leaves are compoſed of two pair of lobes, terminated by an odd one; theſe are narrow at their baſe, but broad and rounded at their ends; they are ſawed on their edges, and are of a light green. The nuts are ſmall, have a ſmooth ſhell, and are very hard and white.

6. JUGLANS *(Ovata)* foliolis lanceolatis ſerratis glabris ſubæqualibus. *Walnut with ſmooth, ſpear-ſhaped, ſawed lobes, which are equal.* Juglans alba fructu ovato compreſſo, nucleo dulci, cortice ſquamoſo. Clayt. Flor. Virg. *White Walnut with an oval compreſſed fruit, a ſweet kernel, and a ſcaly bark, commonly called Shag-bark in America.*

This kind grows naturally in North America, where it riſes to a middling ſtature. The leaves are compoſed of three pair of ſmooth ſpear-ſhaped lobes, of a dark green colour, ſawed on their edges, and ending in acute points. The fruit is oval, the ſhell white, hard, and ſmooth, the kernel ſmall, but very ſweet. The young ſhoots of the tree are covered with a very ſmooth browniſh bark, but the ſtems and older banches have a rough ſcaly bark, from whence it has the appellation of Shag-bark, in America.

The Walnut, in the Linnæan ſyſtem, belongs to the claſs and order *Monoecia Polyandria.* The flowers begin to open about the middle of April, and are in full blow by the middle of May, before which time the leaves are fully diſplayed.

Theſe trees are propagated by planting their nuts, which ſeldom produce the ſame ſort of fruit as ſown; ſo that the only way to have the deſired ſort, is to ſow the nuts

An induſtrious and very experienced huſbandman told me, that if they be tranſplanted as big as one's middle, it may be done ſafer than when younger; I do only report it. What they hint of putting a tile-ſhard under the nuts when firſt ſet, to divaricate and ſpread the roots (which are otherwiſe apt to penetrate very deep) I like well enough. It is certain they will receive their own cyons being graffed, and that it does improve their fruit. The beſt compoſt is the ſtrewing of aſhes at the foot of the trees, the ſalt whereof being waſhed into the earth, is the beſt dreſſing, whilſt the juice of the fallen leaves, though it kill the worm, is noxious to the root. This tree does not refuſe to thrive even among others, and in great woods, provided you ſhrip up the collateral arms.

2. The Walnut delights in a dry, ſound, and rich land, eſpecially if it incline to a feeding chalk or marl; and where it may be protected from

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of the beſt kinds; and if this is done in a nurſery, the trees ſhould be tranſplanted out when they have had three or four years growth, to the place where they are deſigned to remain; for theſe trees do not bear tranſplanting when they are of a large ſize, therefore there ſhould be a good number of the trees planted, which need not be put at more than ſix feet apart, which will be diſtance enough for them to grow till they produce fruit; when thoſe, whoſe fruit are of the deſired kind, may remain, and the others cut up, to allow them room to grow. By this method a ſufficient number of the trees may be generally found among them to remain, which will thrive and flouriſh greatly when they have room; but as many people do not care to wait ſo long for the fruit, the next beſt method is to make choice of ſome young trees in the nurſeries, when they have their fruit upon them. But though theſe trees will grow and bear fruit, yet they will never be ſo large or ſo long-lived, as thoſe which are planted young.

All the ſorts of Walnuts which are intended for timber, ſhould be ſown in the places where they are to remain; for the roots of theſe trees always incline downward, which being ſtopped or broken, prevent their aſpiring upward, ſo that they afterwards divaricate into branches, and become low ſpreading trees; but ſuch as are propagated for fruit, are greatly mended by tranſplanting; for hereby they are rendered more fruitful, and their fruit is generally larger and fairer; it being a common obſervation, that downright roots greatly encourage the luxuriant growth of timber in all ſorts of trees; but ſuch trees as have their roots ſpreading near the ſurface of the ground, always produce the greateſt quantity and beſt-flavoured fruit.

In tranſplanting theſe trees, you ſhould obſerve never to prune either their roots or large branches, both which operations are very injurious to them; nor ſhould you be too buſy in lopping or pruning the branches of theſe trees when grown to a large ſize, for it often cauſes them to decay; but when there is a neceſſity for cutting any of their branches off, it ſhould be done early in September (for at that ſeaſon the trees are not

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the cold, (though it affect cold rather than extreme heat) as in great pits, valleys, and highway ſides; alſo in ſtony-grounds, if loamy, and on hills, eſpecially chalky; likewiſe in corn-fields. Thus Burgundy abounds with them, where they ſtand in the midſt of goodly wheat-lands, at ſixty and an hundred feet diſtance, and ſo far are they from hurting the crop, that they are looked upon as great preſervers by keeping the ground warm, nor do the roots hinder the plow. Whenever they fell a tree, which is only the old and decayed, they always plant a young one near him; and in ſeveral places betwixt Hanaw and Frankfort in Germany, no young farmer whatſoever is permitted to marry a wife, till he bring proof that he hath planted, and is a father of ſuch a ſtated number of Walnut-trees; and the law is inviolably obſerved to this day, for the extraordinary benefit which this tree affords the inhabitants: In truth, were this timber in greater plenty amongſt us, we ſhould have far better utenſils of all ſorts for our

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ſo ſubject to bleed) that the wound may heal over before the cold increaſes; the branches ſhould always be cut off quite cloſe to the trunk, otherwiſe the ſtump which is left will decay, and rot the body of the tree.

The beſt ſeaſon for tranſplanting theſe trees is as ſoon as the leaves begin to decay, at which time if they are carefully taken up, and their branches preſerved entire, there will be little danger of their ſucceeding, although they are eight or ten years old, as I have ſeveral times experienced; though, as was before obſerved, theſe trees will not grow ſo large, or continue ſo long, as thoſe which are removed young. This tree delights in a firm, rich, loamy ſoil, or ſuch as is inclinable to chalk or marl; and will thrive very well in ſtony ground, and on chalky hills, as may be ſeen by thoſe large plantations near Leatherhead, Godſtone, and Carſhalton in Surry, where great numbers of theſe trees are planted upon the downs, which annually produce large quantities of fruit, to the great advantage of their owners.

The diſtance theſe trees ſhould be placed, ought not to be leſs than forty feet, eſpecially if regard be had to their fruit; though when they are only deſigned for timber, if they ſtand nearer, it promotes their upright growth. The black Virginia Walnut is much more inclinable to grow upright than the common ſort, and the wood being generally of a more beautiful grain, renders it preferable to that, and better worth cultivating. I have ſeen ſome of this wood beautifully veined with black and white, which, when poliſhed, has appeared at a diſtance like veined marble. This wood is greatly eſteemed by the cabinet-makers for inlaying, as alſo for bedſteads, chairs, tables, and cabinets; and is one of the moſt durable woods for thoſe purpoſes of Engliſh growth, being leſs liable to be infected with inſects than moſt other kinds (which may proceed from its extraordinary bitterneſs); but it is not proper for buildings of ſtrength, it being of a brittle nature, and exceeding ſubject to break very ſhort, though it commonly gives notice by its crackling ſome time before it breaks.

houſes, as chairs, ſtools, bedſteads, tables, wainſcot, cabinets, &c. inſtead of the more vulgar Beech, ſubject to the worm, weak and unſightly; but which, to counterfeit and deceive the unwary, they waſh over with a decoction made of the green huſks of Walnuts, &c. I ſay, had we ſtore of this material, eſpecially of the Virginian, we ſhould find an incredible improvement in the more ſtable furniture of our houſes, as in the firſt frugal and better days of Rome.

Illa domi natas, noſtraque ex arbore menſas
Tempora viderunt: hos lignum ſtabat in uſus,
Annoſam ſi fortè nucem dejecerat Eurus. JUV. *Sat.* xi.

For if it had been cut in that ſeaſon, it would not have proved ſo ſound, as we ſhew in our chapter of felling. It is certain, that the *Menſæ Nucinæ* were once in price even before the Citron, as Strabo notes; and nothing can be more beautiful than ſome planks and works which I have beheld of it, eſpecially that which comes from Grenoble, of all others the moſt beautiful and eſteemed.

3. They render moſt graceful avenues to our country dwellings, and do excellently near hedge-rows; but had need be planted at forty or fifty feet interval, for they affect to ſpread both their roots and branches. The Bergſtras (which extends from Heidelberg to Darmſtadt) is all planted with Walnuts; for ſo, by another antient law, the Borderers were obliged to nurſe up and take care of them, and that chiefly for their ornament and ſhade, ſo as a man may ride for many miles about that country under a continued arbor, or cloſe walk; the traveller both refreſhed with the fruit and the ſhade, which ſome have cauſeleſly defamed for its ill effects on the head *, for which the fruit is a ſpecific and a notable ſignature; although I deny not, but the ſcent of the fallen leaves, when they begin to be damped with lying, may emit ſomewhat a heady ſteam, which to ſome has proved noxious, but not whilſt they were freſh and lively upon the

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* In Italy, ſleeping under trees was thought a great luxury:

——— molleſque ſub arbore ſomni
Non abſunt. VIRG.

On which account we muſt ſuppoſe that they were choice in the kind of trees moſt friendly to people overcome with ſleep. The ſhade of the Walnut was held to be particularly unwholeſome. Gravis et noxia, etiam capiti humano, omnibuſque juxta ſatis. PLIN.

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trees. How would ſuch public plantations improve the glory and wealth of a nation! But where ſhall we find the ſpirits among our countrymen? Yes, I will adventure to inſtance in thoſe plantations of Sir Richard Stidolph, upon the Downs near Leatherhead in Surry; Sir Robert Clayton, at Morden, near Godſtone, (once belonging to Sir John Evelyn) and ſo about Caſſaulton, where many thouſands of theſe trees do celebrate the induſtry of the owners, and will certainly reward it with infinite improvement, as I am aſſured they do already, and that very conſiderably; beſides the ornament which they afford to thoſe pleaſant tracts, for ſome miles in circumference. There was lately, and for ought I know as yet, an avenue of four leagues in length, and fifty paces in breadth, planted with young Oaklings, as ſtraight as a line, from the city of Utrecht to Amersfort, affording a moſt goodly proſpect; which minds me of what Sorbiere tells in a ſceptical diſcourſe to Monſieur de Martel, ſpeaking of the readineſs of the people in Holland to furniſh and maintain whatſoever may conduce to the public ornament, as well as convenience, "that their plantations of theſe and the like trees, even in their very roads and common highways, are better preſerved and entertained (as I myſelf have likewiſe been often an eye-witneſs) than thoſe about the houſes and gardens of pleaſure belonging to the Nobles and Gentry of moſt other countries;" and in effect it is a moſt raviſhing object, to behold their amenities in this particular. With us, ſays he, ſpeaking of France, they make a jeſt at ſuch political ordinances, by running down theſe public and uſeful ornaments, if haply ſome more prudent magiſtrate do at any time introduce them. Thus in the reign of Henry IV. (during the ſuperintendency of Monſ. de Sully*) there was a reſolution of adorning all the highways of France with Elms, &c. but the rude and miſchievous peaſants did ſo hack, ſteal, and deſtroy what they had begun, that they were forced to deſiſt from the thorough

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* This celebrated Stateſman emphatically ſtiles Agriculture one of the *Breaſts* from whence the ſtate muſt draw its nouriſhment. Inſtructing by precepts, and ſtimulating by rewards, he prevailed upon his countrymen to cultivate the art; but their induſtry was of ſhort duration: The public troubles ſoon put an end to Arts, Agriculture, and Commerce. Colbert conceived a different notion of policy; eſteeming manufactures and commerce as the ſinews of the ſtate, he gave all poſſible encouragement to the Artizan and the Merchant,——but forgot that the Manufacturer muſt eat his bread at a moderate price. The Farmer being diſcouraged, the neceſſaries of life became dear;—the public granaries were ill ſtored;——manufactures languiſhed;—commerce drooped;—a numerous army ſoon conſumed the ſcanty harveſt; and, in a ſhort time, Induſtry fell a ſacrifice to the ill-judged policy of the Miniſter.

proſecution of the deſign; ſo as there is nothing more expoſed, wild, and leſs pleaſant than the common roads of France for want of ſhade, and the decent limits which theſe ſweet and divertiſant plantations would have afforded. Not to omit that political uſe, as my Lord Bacon hints it, where he ſpeaks of the ſtatues and monuments of brave men, and ſuch as had well deſerved of the public, erected by the Romans even in their highways; ſince, doubtleſs, ſuch noble and agreeable objects would exceedingly divert, entertain, and take off the minds and diſcourſes of melancholy people, and penſive travellers, who having nothing but the dull and encloſed ways to caſt their eyes on, are but ill converſation to themſelves and others, and, inſtead of celebrating, cenſure their ſuperiors. It is obſerved by a curious perſon, an induſtrious friend of mine, that the ſap of this tree riſes and deſcends with the ſun's diurnal courſe, (which it viſibly ſlackens in the night) and more plentifully at the root on the ſouth ſide, though thoſe roots cut on the north were larger, and leſs diſtant from the body of the tree; and not only diſtilled from the ends, which were next the ſtem, but from thoſe that were cut off and ſeparated, which was never obſerved to happen in the Birch, or other ſap-yielding trees.

* Mr. Oldenburg ſpeaks of one of the preſent Kings in Europe, who drinks much of the juice of this tree, and finds great benefit thereby.

* Phil. Tranſ. vol. iii. N° xl. p. 802.

4. What univerſal uſe the French make of the timber of this ſole tree, for domeſtic affairs, may be ſeen in every room both of poor and rich. It is of ſingular account with the joiner, for the beſt grained and coloured wainſcot; with the gunſmith for ſtocks; with the coach-maker for wheels and the bodies of coaches; in New England they make hoops, and bows for want of Yew; the drum-maker uſes it for rims, the cabinet-maker for inlayings, eſpecially the firm and cloſe timber about the root, which is admirable for flecked and cambleted works, ſome wood eſpecially, as that which we have from Bologne, New England, and Virginia (where there are three or four ſorts, differing in leaf, fruit, and ſtature) very black of colour, and ſo admirably ſtreaked, as to repreſent natural flowers, landſkips, and other fancies. To render this wood the better coloured, joiners put the boards into an oven after the batch is forth, or lay them in a warm ſtable; and when they work it, poliſh it over with its own oil very hot, which makes it look black and ſleek, and the older it is, the more eſtimable; but then it ſhould not be put in work till thoroughly ſeaſoned, becauſe it will ſhrink beyond expectation. It is only not good to confide in

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it much for beams or joiſts, becauſe of its brittleneſs, yet of which, it has been obſerved to give timely notice, like the Cheſnut, by the crackling before it breaks. Beſides the uſes of the wood, the fruit, with huſk and all, when tender and very young, is uſed for preſerves (being condited in ſeparate decoctions) by our curious Ladies. It makes alſo food and oil; this laſt is of extraordinary uſe with the painter, in whites, and other delicate colours, alſo for gold ſize and varniſh; and with this they poliſh walking-ſtaves, and other works which are wrought in with burning: They fry with it in ſome places, and eat it inſtead of butter in Berry, where they have little or none good; and therefore they plant infinite numbers of theſe trees all over that country: The uſe of it to burn in lamps is common there. The younger timber is held to make the better-coloured work, and ſo the Oak, but the older more firm and cloſe, is finer cambleted for ornament; and the very huſks and leaves being macerated in warm water, and that liquor poured on the carpet of walks and bowling-greens, does infallibly kill the worms, without endangering the graſs*; not to mention the dye which is made of this lixive, to colour wool, woods, and hair, as of old they uſed it. The water of the huſks is ſovereign againſt all peſtilential infections, and that of the leaves to mundify and heal inveterate ulcers. That which is produced of the thick ſhell, becomes beſt timber; that of the thinner, better fruit. Columella has ſundry excellent rules how to aſcertain and accelerate the growth of this tree, and to improve its qualities; and I am aſſured, that having been graffed on the Aſh, though others ſay no inſition improves it, it thrives exceedingly, becomes a handſome tree, and, what is moſt eſtimable, bears its fruit within four years; all which I recommend to the farther induſtrious. The green huſk dried, or the firſt peeping red buds and leaves reduced to powder, ſerves inſtead of pepper, to condite meats and ſauces. It is thought better to cudgel off the fruit, when dropping ripe, than to gather it by hand; and that the huſk may open, lay them by in a dry room, ſometimes turning them with a broom, but without waſhing, for fear of mouldineſs. In Italy they arm the tops of long poles with nails and iron for the purpoſe, and believe the beating improves the tree; which I no more believe, than I do that diſcipline would reform a Shrew. Thoſe nuts, which come eaſily out of

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* There is nothing peculiarly noxious to worms in the bitter decoction of Walnut leaves. Worms cannot bear the application of any thing bitter to their bodies, which is the reaſon that bitters, ſuch as Gentian, are the beſt deſtroyers of worms lodged in the bowels of animals. Worms are ſeldom obſerved in the inteſtines of the human body, excepting in caſes where the bile is either weak or deficient.

their huſks, ſhould be laid to mellow in heaps, and the reſt expoſed in the ſun, till the ſhells dry, elſe they will be apt to periſh the kernels: ſome again preſerve them in their own leaves, or in a cheſt made of Walnut-tree wood, others in ſand, eſpecially if you will preſerve them for a ſeminary: Do this in October, and keep them a little moiſt, that they may ſpear, to be ſet early in February. Thus after two years they may be removed at a yard aſunder, cutting the tap-root and ſide branches, but ſparing the head; and being two yards high, bud, or remove them immediately. Old nuts are not wholeſome till macerated in warm and almoſt boiling water; but if you lay them in a leaden pot, and bury them in the earth, ſo as no vermin can attack them, they will keep marvellouſly plump the whole year about, and may eaſily be blanched *. In Spain they uſe to ſtrew the gratings of old and hard nuts, firſt peeled, into their tarts and other meats. For the oil, one buſhel of nuts will yield fifteen pounds of peeled and clear kernels, and that half as much oil, which the ſooner it is drawn, is the more in quantity, though the drier the nut, the better in quality; the lees, or marc of the preſſing, is excellent to fatten hogs with. After the nuts are beaten down, the leaves ſhould be ſweeped into heaps, and carried away, becauſe their extreme bitterneſs impairs the ground, and, as I am aſſured, prejudices the trees: The green huſks boiled, make a good colour to dye a dark yellow, without any mixture; and the diſtillation of its leaves with honey and urine, makes hair ſpring on bald heads. Beſides its uſe in the famous Salernitan Antidote †, if the kernel, a little, maſticated, be applied to the bite of a ſuſpected mad dog, and when it has lain three hours, be caſt to poultry, they will die if they eat of it. In Italy, when a countryman finds any pain in his ſide, he drinks a pint of the freſh oil of this nut, and finds immediate eaſe. And more famous is the wonderful cure which the fungous ſubſtance, ſeparating the lobes of the kernel, pulverized and drank in wine, in a moderate quantity, did perform upon the Engliſh army in Ireland afflicted with a Dyſentery, when no other remedy could prevail. The juice of the outward rind of the

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* I have kept Filberts quite freſh by burying them ſome feet under ground in pots, out of the reach of air. The ſame may probably be done with Walnuts.

† Allia, ruta, pyra, et raphanus, cum theriaca, *nux*,
Præſtant antidotum contra lethale venenum. *Schol. Salern.*

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nut makes an excellent gargle for a ſore throat: The kernel being rubbed upon any crack or chink of a leaky or crazy veſſel, ſtops it better than either clay, pitch, or wax. In France they eat them blanched and freſh, with wine and ſalt, having firſt cut them out of the ſhells before they are hardened, with a ſhort broad braſs knife, becauſe iron ruſts; and theſe they call Cernois, from their manner of ſcooping them out. Laſtly, of the fungus emerging from the trunk of an old tree, and indeed ſome others, is made touch-wood; artificially prepared in a lixivium, or lye, dried, and beaten flat, and then boiled with ſalt-petre, to render it apter to kindle. The tree wounded in the ſpring, yields a liquor, which makes an artificial wine. For other ſpecies, ſee Mr. Ray's Dendrolog. tom. iii. p. 5, 6.



The White Beam Tree.

J. Miller del. Sculp.

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CHAP. X.

The SERVICE*.

CHAP. X.

1. SORBUS, the Service-tree (of which there are four ſorts) is raiſed of the chequers, or berries, which being ripe, that is rotten, about September, and the pulp rubbed off clean from the ſtones in dry ſand, and ſo kept till after Chriſtmas, may be ſown like Beech-maſt, and educated in the nurſery like the Cheſnut. It is reported that the ſower never ſees the fruit of his labour, either for that it bears only being very old, or that men are commonly ſo before they think of planting trees: But this is an egregious miſtake; for theſe come very ſoon to be trees, and being planted young, thrive exceedingly: I have likewiſe planted them as big as my arm ſucceſsfully. The beſt way is therefore to propa-

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* Of the Wild Service there are numerous ſpecies.

1. CRATÆGUS *(Aria)* foliis ovatis inæqualiter ſerratis, ſubtus tomentoſis. Hort. Cliff. 187. *Wild Service with oval leaves unequally ſawed, and woolly on their under ſide.* Cratægus folio ſubrotundo, ſerrato, ſubtus incano. Tourn. Inſt. R. H. 633. Aria. Dalech. Hiſt. 202. Sorbus Alpina. Bauh. Hiſt. i. p. 65. *The White Beam, or White-leaf Tree.*

This tree riſes to the height of thirty feet, and grows naturally upon the chalky hills of Kent, Surry, and Suſſex. The young ſhoots have a brown bark covered with a mealy down. The leaves are oval, of a light green colour upon their upper ſide, but white on their under, having many prominent tranſverſe nerves running from the midrib to the border. They are unequally ſerrated. The flowers are produced at the end of the branches in May. They grow upon mealy foot-ſtalks, and are ſucceeded by red berries which ripen in autumn.

2. CRATÆGUS *(Torminalis)* foliis cordatis ſeptangulis, lobis infimis divaricatis. Lin. Sp. Plant. 681. *Wild Service with heart-ſhaped leaves, having ſeven angles, whoſe lower lobes ſpread aſunder.* Cratægus foliis cordatis acutis: lacinulis acutis ſerratis. Hort. Cliff. 187. Meſpilus apii folio, Sylveſtris non ſpinoſa, ſeu Sorbus Torminalis. Bauh. Pin. 454. Sorbus Torminalis et Cratægus Theophraſti. Bauh. Hiſt i. p. 63. *Wild, or Maple-leaved Service.*

This ſort grows naturally in many parts of England, and is chiefly found upon ſtrong ſoils: it formerly grew in great plenty in Cane-wood, near Hampſtead; and lately there were ſome young trees growing in Biſhop's-Wood, near the ſame

Book I. gate them of ſuckers, of which they put forth enough, as alſo of ſets, and may be budded with great improvement. They delight in reaſonable good ſtiff ground, rather inclining to cold than over hot; for in places which are too dry they never bear kindly. The Torminalis (ſo called for its effects againſt gripings in the bowels) is the kind moſt frequent with us; for thoſe of the narrower and leſs-indented leaf are not ſo common in England as in France, bearing a ſort of berry of the pear-ſhape, and is there called the Cormier. This tree may be graffed either on itſelf or on the White-Thorn and Quince. To this we might add the Meſpilus or

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place; but in many parts of Hertfordſhire there are large trees now growing. It riſes to the height of forty or fifty feet, with a large trunk, ſpreading at the top into many branches, ſo as to form a large head. The young branches are covered with a purpliſh bark, marked with white ſpots, and are garniſhed with leaves placed alternately, ſtanding on pretty long foot-ſtalks; theſe are cut into many acute angles, like thoſe of the Maple-tree, and are near four inches long, and three broad in the middle, having ſeveral ſmaller indentures toward the top, of a bright green on their upper ſide, but a little woolly on their under. The flowers are produced in large bunches toward the end of the branches; they are white, and ſhaped like thoſe of the Pear-tree, but ſmaller, and ſtand upon longer foot-ſtalks; theſe appear in May, and are ſucceeded by roundiſh compreſſed fruit, which are ſhaped like large Haws, and ripen late in autumn, when they are brown; and if kept till they are ſoft, in the ſame way as Medlars, they have an agreeable acid flavour. The fruit of this tree is ſold in the London markets in autumn.

3. Cratægus *(Alpina)* foliis oblongo-ovatis ſerratis, utrinque virentibus. *Wild Service with oblong, oval, ſawed leaves, which are green on both ſides.* Cratægus folio oblongo, ſerrato, utrinque virenti. Tourn. Inſt. 633.

This ſpecies grows naturally upon mount Baldus, and on other mountainous parts of Italy; it riſes with a woody trunk about twenty feet high, dividing into many branches, which are covered with a purpliſh ſpotted bark, and cloſely garniſhed with oblong ſawed leaves, ſtanding alternate, on very ſhort foot-ſtalks; they are about three inches long, and one and a half broad, in the broadeſt part, leſſening toward both ends; they are ſlightly ſawed on their edges, and of a deep green on both ſides. The flowers are produced at the end of the branches in ſmall bunches, which have rarely more than four or five flowers in each; they are white, and much ſmaller than thoſe of the former ſorts; theſe are ſucceeded by fruit about the ſize of the common Haw, which is of a dark brown colour when ripe. It flowers in May, and the fruit ripens in Autumn.

4. Cratægus *(Coccinea)* foliis ovatis repando-angulatis ſerratis glabris. Hort. Cliff. 187. *Wild Service with oval, ſmooth, ſawed leaves, having angles.* Meſpilus ſpi-



The Wild Service Tree.

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J. Miller del. & sculpt.

Medlar, being an hard wood, and of which I have ſeen very beautiful walking-ſtaves. But there is yet a rare kind of Service-tree, frequent in Germany, which we find not in our woods; and they ſpeak of another ſort, which bears poiſon-berries. CHAP. X.

2. The timber of the Sorb is uſeful for the joiner, and of which I have ſeen a room curiouſly wainſcotted: Alſo for the engraver of wood cuts; for bows, pulleys, ſcrews, mill and other ſpindles; for goads to drive oxen with; for piſtol and gun-ſtocks, and for moſt that the wild Pear-tree ſerves;

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noſa, Oxyacantha Virginiana maxima. Tourn Inſt. 633. Commonly called *Cockſpur Hawthorn.*

The Virginian Cockſpur-thorn will grow to about twenty feet high. It riſes with an upright ſtem, irregularly ſending forth branches, which are ſmooth, and of a browniſh colour, ſpotted thinly with ſmall white ſpots. It is armed with thorns that reſemble a Cockſpur, which gives it the appellation of Cockſpur-thorn. In winter, the leaf-buds appear large, turgid, and have a bold and pleaſant look among others of different appearances. In ſummer, this tree is very delightful. The leaves are oval, angular, ſerrated, ſmooth, and bend backwards. They are about four inches long, and three and a half broad; have five or ſix pair of ſtrong nerves running from the mid-rib to the border; and die to a browniſh red colour in the autumn. The flowers are produced in very large umbels, making a noble ſhew in May, and are ſucceeded by large fruit, of a bright-red colour, which have a good effect in the winter.—The principal varieties of this ſpecies are, the Cockſpur-hawthorn with many thorns; the Cockſpur-hawthorn with no thorn; the Cockſpur with eatable fruit.

5. CRATÆGUS *(Crus Galli)* foliis lanceolato-ovatis ſerratis glabris, ramis ſpinoſis. Lin. Sp. 682. *Cratægus with oval, ſpear-ſhaped, ſawed leaves, and prickly branches.* Meſpilus aculeata pyrifolia denticulata ſplendens, fructu inſigni rutilo, Virginienſis. Pluk. Alm. 249. Commonly called *Virginian L'Azarole.*

This ſpecies will grow to be near twenty feet high. The ſtem is robuſt, and covered with a light-coloured bark. The branches are produced without order; are of a dark-brown colour, and poſſeſſed of a few long ſharp thorns. The leaves are ſpear-ſhaped, oval, ſmooth, and ſerrated; of a thickiſh conſiſtence, and often remain on the tree the greateſt part of the winter. Each ſeparate flower is large; but as few of them grow together, the umbels they form are rather ſmall. They come out in May, and are ſucceeded by large dark red-coloured fruit, which ripens late in the autumn.

6. CRATÆGUS *(Lucida)* foliis lanceolatis ſerratis lucidis, ſpinis longiſſimis floribus corymboſis. *Cratægus with lucid, ſpear-ſhaped, ſawed leaves, very long ſpines, and*

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being of a very delicate grain it ſerves the turner for divers curioſities, and looks beautifully, and is almoſt everlaſting; when rubbed over with oil of linſeed, well boiled, it is made to counterfeit Ebony, or almoſt any Indian wood, coloured according to art: Alſo it is taken to build with, yielding beams of conſiderable ſubſtance. The ſhade is beautiful for walks, and the fruit not unpleaſant, eſpecially the ſecond kind, of which, with new wine and honey, they make a conditum of admirable effect to corroborate the ſtomach; and the fruit alone is good in dyſente-

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flowers in a corymbus. Meſpilus prunifoliis, ſpinis longiſſimis fortibus, fructu rubro magno. Flor. Virg. 55.

This kind grows naturally in North America, and riſes with a ſtrong ſtem to the height of ten or twelve feet, ſending out many ſtrong irregular branches, which, while young, are covered with a bright-brown bark, but the older branches have it of a lighter colour; the leaves are oval, ſpear-ſhaped, ſlightly ſawed on their edges, of a bright-green on their upper ſide, but paler on their under; ſometimes they are placed by pairs, at other times three or four come out from the ſame joint; the flowers are produced in large cluſters toward the end of the branches, forming a ſort of corymbus, and are ſucceeded by roundiſh fruit of a middling ſize, and a deep-red colour. As the branches of this ſort ſhoot very ſtrong, and are generally interwoven with each other, being armed with very long ſtrong thorns, it is very proper for outward fences to gardens or fields.

7. CRATÆGUS *(Azarolus)* foliis obtuſis ſubtrifidis ſub-dentatis. Lin. Sp. Pl. 683. *Cratægus with obtuſe, trifid, indented leaves.* Meſpilus Apii folio laciniato. C. B. P. 453. Commonly called *L'Azarole.*

This grows naturally in Italy and the Levant, where the fruit is ſerved up to table with the deſert; it has a ſtrong ſtem riſing twenty feet high, having many ſtrong irregular branches, covered with a light-coloured bark; the leaves are in ſhape ſomewhat like thoſe of the common Hawthorn, but are much larger, have broader lobes, and are of a paler colour; the flowers come out in ſmall cluſters from the ſide of the branches, which are in ſhape like thoſe of the common Hawthorn, but much larger; as is alſo the fruit, which when fully ripe has an agreeable acid taſte, for which it is eſteemed by the inhabitants of the countries where it grows naturally.

8. CRATÆGUS *(Oxyacantha)* foliis obtuſis ſubtrifidis ſerratis. Hort. Cliff. 188. *Cratægus with obtuſe, trifid, ſawed leaves.* Meſpilus, Apii folio, ſylveſtris ſpinoſa, ſ. Oxyacantha. C. B. P. 454. *The common White Thorn.*

This admirable and uſeful ſpecies ſports in the following varieties: The Large Scarlet Hawthorn; the Yellow Haw; the White Haw; the Maple-leaved Hawthorn; the Double-bloſſomed Hawthorn; and the Glaſtonbury Thorn.——The Large Scarlet Hawthorn is no more than a beautiful variety of the Common Haw. It

ries and laſks. The water diſtilled from the ſtalks of the flowers and leaves in B. M. and twice rectified upon freſh matter, is incomparable for conſumptive and tabid bodies, taking an ounce daily at ſeveral times: Likewiſe it cures the green-ſickneſs in virgins, and is prevalent in all

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is exceedingly large, oblong, perfectly ſmooth, and of a bright ſcarlet; and, from the additional ſplendor it acquires by the berries, it is propagated to cauſe variety in plantations for obſervation and pleaſure.—The Yellow Haw is a moſt exquiſite plant. The buds at their firſt coming-out in the ſpring, are of a fine yellow, and the fruit is of the colour of gold. The tree is a great bearer, and retains its fruit all winter, cauſing a delightful effect in plantations of any kind. It was originally brought from Virginia, is greatly admired, and no collection of hardy trees ſhould be without it.——The White Haw is but a paltry tree, compared with the former. It hardly ever grows to the height of the Common Hawthorn, is an indifferent bearer, and the fruit is ſmall, and a very bad white.—The Maple-leaved Hawthorn will grow to be near twenty feet high, and has very few thorns. The leaves are larger than the Common Hawthorn, reſemble thoſe of the Maple, and are of a whitiſh green colour. The flowers are produced in large bunches, in June, and are ſucceeded by remarkable fruit, of a ſhining red, which looks beautiful in the winter.——The Double-bloſſomed Hawthorn produces a full flower, and is one of the ſweeteſt ornaments in the ſpring. Nature ſeems to have peculiarly deſigned this ſort for the pleaſure-garden; for tho' it be the Common Hawthorn only, with the flowers doubled, yet it may be kept down to what ſize the owner pleaſes; ſo that it is not only ſuitable for wilderneſs-quarters, ſhrubberies, and the like, but it is alſo uſeful for ſmall gardens, where a tree or two only are admitted. Theſe beautiful double flowers come out in large bunches, in May, and the tree is ſo good a bearer, that it will often appear covered with them. Their colour, at their firſt appearance, is a delicate white: They afterwards die to a faint red colour, and are frequently ſucceeded by ſmall imperfect fruit.—The Glaſtonbury Thorn differs in no reſpect from the Common Hawthorn, only that it ſometimes flowers in the winter. It is ſaid to have been originally the ſtaff of Joſeph of Arimathea, that noble counſellor who buried Chriſt. He, according to the tradition of the abbey of Glaſtonbury, attended by twelve companions, came over into Britain, and founded, in honour of the Bleſſed Virgin, the firſt Chriſtian Church in this iſland. As a proof of his miſſion, he is ſaid to have ſtuck his ſtaff into the ground, which immediately ſhot forth and bloſſomed. By ſome credulous deluded people this tree was long thought to put forth its bloſſoms on Chriſtmas-day, but, to the honour of true religion, this ſanctified deceit is now ſunk into diſcredit, even with the meaneſt of the vulgar.

9. CRATÆGUS *(Tomentoſa)* foliis cuneiformi-ovatis ſerratis ſubangulatis ſubtus villoſis, ramis ſpinoſis. Lin. Sp. 682. *Cratægus with oval, wedge-ſhaped, ſawed, angular*

BOOK I. fluxes; diſtilled warm into the ears, it abates the pain; the wood or bark contuſed, and applied to any green wound, heals it; and the powder thereof drank in olive oil conſolidates inward ruptures: Laſtly, the ſalt of the wood, taken in decoction of althæa to three grains, is an incom-

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leaves, hoary on their under ſide, and prickly branches. Meſpilus Virginiana, groſſulariæ foliis. Pluk, Phyt. 100. f. 1.

This ſort grows naturally in North-America; it has a ſlender ſhrubby ſtalk, riſing about ſix or ſeven feet high, ſending out many irregular branches, armed with long ſlender thorns, and garniſhed with ſhort, oval, wedge-ſhaped leaves, which are ſawed on their edges, and are woolly on their under ſide; the flowers are ſmall, proceeding from the ſide of the branches, ſtanding ſometimes ſingle, and at other times two or three upon the ſame foot-ſtalk, having large leafy empalements, and are ſucceeded by ſmall roundiſh fruit, with a large leafy umbilicus, which before was the empalement of the flower: the flowers appear the beginning of June, and the fruit ripens very late in the autumn.

All theſe ſpecies are propagated by ſowing of the ſeeds; and the varieties are continued by budding them upon ſtocks of the white thorn.——In order to raiſe them from ſeeds, it is, by ſome, adviſed to ſow them ſoon after they are ripe, in beds of freſh, light, rich earth. Let alleys be left between the beds, for the conveniency of weeding, and let the ſeeds be covered over with fine mould, about an inch deep. The ſummer following, the beds muſt be kept clean of weeds, and probably ſome few plants will appear: But this is not common in any of the ſorts; for they generally lie till the ſecond ſpring after ſowing before they come up. At the time they make their appearance they muſt be watered, if the weather proves dry; and this ſhould be occaſionally repeated all ſummer. They ſhould alſo be conſtantly kept clean from weeds; and in the autumn the ſtrongeſt may be drawn out, and ſet in the nurſery-ground, a foot aſunder, in rows two feet diſtant from each other; while the weakeſt may remain until another year.—During the time they are in the nurſery, the ground between the rows ſhould be dug every winter, and the weeds conſtantly hoed down in the ſummer; and this is all the trouble they will require until they are planted out for good, which may be in two, three, or more years, at the pleaſure of the owner, or according to the purpoſes for which they are wanted.——I rather recommend them to be raiſed as the Common Haw in the following manner: The Common Haw, uſed for our fences in England, ſhould, as ſoon as gathered, be buried in a dry trench in the month of October. To prevent their being heated, it will be proper to pick off any leaves that may have been gathered with them; and for the ſame reaſon they ſhould not lie above a foot thick in the trench. In this bed they ſhould remain two winters and one ſummer. In the ſecond ſpring they will begin to ſprout when they ſhould be ſown in beds, and kept clear from weeds. Some of thoſe plants will be of ſize to plant out for hedges the firſt year, and, in the north of England, will ſell for four ſhillings per thouſand; but it is much more judicious to draw them from the ſeed-bed and tranſplant them

parable remedy to break and expel gravel *. The Service gives the Huſ- CHAP. X.
bandman an early preſage of the approaching ſpring, by extending its adorned buds for a peculiar entertainment, and dares peep out in the ſevereſt winters.

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into the nurſery at four inches diſtance from each other. There they ſhould remain two years, at the expiration of which time they will have got good roots. Such plants are cheaper at twelve ſhillings a thouſand than thoſe from the ſeed-bed at half a crown. To this obſervation I earneſtly requeſt the attention of all perſons engaged in making incloſures.

In the Linnæan Syſtem the Cratægus, or Wild Service, is of the claſs and order *Icoſandria Digynia*, the flower having twenty or more ſtamina and two ſtyles.

* The fixed alkaline ſalt, produced from burnt vegetables, is ſimilar in its nature and effects, whether made from the aſhes of the Service-tree, the Oak, the Aſh, or any other vegetable body. Such ſalts are generally ſuppoſed, by Phyſicians, to be diſſolvers of the ſtone, and capable of preventing the attraction of the ſtony particles towards each other, whereby the formation of gravel in the kidneys is prevented.

CHAP. XI.

The BLACK CHERRY *.

Book I. I Rank this amongſt the foreſt berry-bearing trees (frequent in the hedges, and growing wild in Herefordſhire, and many places; for I ſpeak not here of our orchard Cherries, ſaid to have been brought into Kent out of Flanders by Henry VIII.) chiefly from the ſuffrage of that induſtrious planter, Mr. Cooke, from whoſe ingenuity and experience (as well as out of gratitude for his frequent mentioning of me in his elaborate and uſeful work) I acknowledge to have benefited myſelf; though I have alſo given no obſcure taſte of this pretty tree in chap. xxi.

It is raiſed of the ſtones of Black Cherries very ripe, (as they are in July) endeavouring to procure ſuch as are full and large; whereof ſome, he tells us, are a little inferior to the Black Orleance, without graffing, and from the very genius of the ground. Theſe gathered, the fleſhy part is to be taken off by rolling them under a plank in dry ſand; and when the humidity is off (as it will be in three or four days) reſerve them in ſand again, a little moiſt and houſed, till the beginning of February, when you may ſow them in a light gravelly mould, keeping them clean for two years, and thence planting them into your nurſeries to raiſe other kinds upon, or for woods, copſes, and hedge-rows, and for walks and avenues, which, if of a dryiſh ſoil, mixt with loam, though the bottom be gravel, will thrive into ſtately trees, beautified with bloſſoms of a ſurprizing whiteneſs, greatly relieving the ſedulous bees, and attracting birds.

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* The Wild Cherry-tree is titled Prunus umbellis ſubpedunculatis, foliis ovato-lanceolatis conduplicatis glabris. Sp. Pl. 679. J. Bauhine calls it Ceraſus Sylveſtris, fructu nigro et rubro. In the Linnæan Syſtem, it belongs to the claſs and order *Icoſandria Monogynia*, having twenty or more ſtamina, and only one ſtyle.

This tree is very proper to plant in parks, becauſe it grows to a large ſize, and makes a beautiful appearance. In the ſpring, when in full flower, it is highly ornamental. It thrives in poor land much better than moſt other ſorts. The French often plant it for avenues to their houſes. They alſo cultivate it in their woods for hoops, for which purpoſe they eſteem it much. The ſtones of the Wild Cherry are generally ſown for raiſing ſtocks to graft, or bud, the other ſorts of Cherries upon, being of a quick growth, and conſiderable duration.



The wild Black Cherry Tree

Pl. Miller del. & sc.

If you ſow them in beds immediately after they are excarnated, they will appear the following ſpring, and then, at two years ſhoot, be fit to plant out where you pleaſe; otherwiſe, being kept too long e'er you ſow them, they will ſleep two winters: And this is a rule which he preſcribes for all ſorts of ſtone-fruit.

You may almoſt at any time remove young Cherry-trees, abating the heads to a ſingle ſhoot.

He recommends it for the copſe, as producing a ſtrong ſhoot, and as apt to put forth from the roots as the Elm, eſpecially if you fell luſty trees: In light ground it will increaſe to a goodly tall tree, of which he mentions one that held above eighty-five feet in height. I have myſelf planted of them, and imparted to my friends, which have thrived exceedingly; but till now did not inſert it among the foreſters: The virtues of the fruit of this Cherry-tree againſt the epilepſy, palſy, and convulſions, are in the ſpirits and diſtilled waters. Concerning its other uſes, ſee the chapter above-mentioned. This tree affords excellent ſtocks for the budding and graffing of other Cherries on.

And here I might mention the Bitter Cherry of Canada, (though exceedingly unlike to ours) which ſhould yet be propagated for the incomparable liquor it is ſaid to yield, preferable to the beſt limonade, by an inciſion of two inches deep in the ſtem, and ſloping to the length of a foot, without prejudice to the tree. What is ſaid of it, and of the Maple, in the late diſcovery of the North-America, may be ſeen in the late deſcription of thoſe countries. For other exotic ſpecies, vide Raii Dendrolog. tom. iii. p. 45, 46.

CHAP. XII.

The MAPLE.

Book I. 1. ACER MINUS, the Maple, (of which authors reckon many kinds) was of old held in equal eſtimation almoſt with the Citron, eſpecially the Bruſcum, the French Maple, and the Pavonaceous, Peacock's-tail Maple, which is that ſort ſo elegantly undulated, and criſped into variety of curls, as emulates the famous Citria. It were a moſt laudable attempt, if ſome would enquire out, and try the planting of ſuch ſorts as are not indigenous amongſt us; as is eſpecially the German Aier, and that of Virginia, not yet cultivated here, but an excellent tree: And if this were extended likewiſe to other timber and exotic trees, it would prove of extraordinary benefit and ornament to the public, and were worthy even of the royal care. They are all produced of ſeeds contained in the folliacles and keys, or birds-tongues (as they are called) like the Aſh (after a year's interment) and, like to it, affect a ſound and a dry mould, growing both in woods and hedge-rows, eſpecially in the latter; which,

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* Of the Maple there are various ſpecies.

1. ACER *(Pſeudo-Platanus)* foliis quinquelobis inæqualiter ſerratis, floribus racemoſis. Lin. Sp. Pl. 1495. *The greater Maple, or Sycamore-tree.*

This is a large-growing tree, and adapted to encreaſe the variety in our woods and fields. It is very proper, if kept down, for underwood, becauſe it ſhoots very faſt from the ſtool and makes excellent fuel.——There is no tree more proper than this to form large plantations near the ſea; for the ſpray, which is prejudicial to moſt trees, ſeems to have no bad effect upon it.——The Sycamore is not only a large timber-tree, but will ſtand long on the ſoil before it decays. This may be ſeen from what St. Hierom ſays, who lived in the fourth century after Chriſt, namely, That he ſaw the Sycamore-tree which Zaccheus climbed up, to ſee our Saviour ride in triumph to Jeruſalem.——The propagation of the Sycamore is very eaſy. In the autumn, when the keys are ripe, they may be gathered, and in a few days after ſown, as has been directed for the Aſh.——In the ſpring the plants will appear, and make a ſhoot of about a foot and a half by the autumn following, if the ground of the ſeminary be tolerably good, and they are kept clean from weeds. The ſpring after they come up, they ſhould be planted in the nurſery, in rows two feet and a half aſunder, and their diſtance in the rows muſt be one foot and a half. Here they may remain till they are big enough to plant out for good, with no farther trouble than taking off unſightly ſide-branches, and



The common Maple & Tree

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J. C. Stadler sculp.

if rather hilly than low, affords the faireſt timber. It is alſo propagated by layers and ſuckers. By ſhredding up the boughs to a head, I have cauſed it to ſhoot to a wonderful height in a little time; but if you will lop it for the fire, let it be done in January; and indeed it is obſerved to be of noxious influence to the ſubnaſcent plants of other kinds, by reaſon of a clammy dew, which it ſheds upon them; and therefore they ſhould not be indulged in Pollards or ſpreading trees, but to thicken underwoods and copſes. The timber is far ſuperior to Beech for all uſes of the turner, who ſeeks it for diſhes, cups, trays, trenchers, &c. as the joiner for tables, inlayings, and for the delicateneſs of the grain, when the knurs and nodoſities are rarely diapered, which does much advance its price: Our turners will work it ſo thin, that it is almoſt tranſparent. It is CH. XII.

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ſuch as have a tendency to make the tree forked, except digging between the rows, which muſt always be done every winter.

2. ACER *(Campeſtre)* foliis lobatis obtuſis emarginatis. Fl. Suec. 925. Acer Campeſtre et minus. C. B. P. 431. *The ſmall, or common Maple.*

This does not grow to ſuch a large ſize as the Sycamore, though its timber is of greater value.—We meet with high encomiums on this wood among the antients: Pliny gives us many; and Virgil introduces Evander ſitting on a Maple throne. The firſt-mentioned author highly commends the Maples growing in different parts of the world, and extols many of them for the remarkable fineneſs of their grain: Indeed the fineneſs of the grain ever governs the value of the wood. In former times, ſo mad were people in ſearching for the Bruſcum of this tree, which often formed the exact repreſentation of birds, beaſts, &c. that they ſpared no expence in procuring it to be made up into ſuch little ornaments as beſt pleaſed their taſte. But when boards, big enough for tables, were found of this curious part of the wood, the extravagance of purchaſers was incredible. We read of a table which coſt ten thouſand ſeſterces, and of another that fetched fifteen thouſand; nay, of one which ſold for its weight in gold.—The Maple is ſeldom planted in ſuch quantities together as to form woods; but where they appear in plantations, they are generally cut down for underwood; for which purpoſe they anſwer extremely well, as they ſhoot away from their ſtools very faſt, and make tolerable fuel.—The largeſt trees are generally found in hedge-rows, where they are occaſionally to be met with all over the kingdom. The timber with us is deemed excellent, and is uſed for ſeveral curious purpoſes, ſuch as muſical inſtruments, inlayings, &c. For the making of turnery ware alſo, ſuch as diſhes, bowls, trays, &c. it is ſuperior to moſt other wood.——The flower-buds of the Maple begin to open about the ſixth of April, and the leaves are out about the eighteenth. The flowers are in full blow about the eleventh of May, and the ſeeds are ripe in the autumn.——If a quantity of theſe trees are

BOOK I. commended for its lightneſs, under the name Aier, and employed often by thoſe who make muſical inſtruments; that eſpecially which grows in Friuli, Carniola, and Saltzburglandt. There is a larger ſort which we call the Sycamore.

2. Pliny's deſcription of this leſſer Maple, and the antient value of it, is worth the citing. *Acer operum elegantiâ & ſubtilitate Cedro ſecundum. Plura ejus genera. Album quod præcipui candoris, vocatur Gallicum in Tranſpadana Italia, tranſque Alpes naſcens. Alterum genus criſpo macularum diſcurſu: qui cum excellentior fuit, a ſimilitudine caudæ pavonum nomen accepit.* "The "Maple, for the elegancy and fineneſs of the wood, is next to the very "Cedar itſelf. There are ſeveral kinds of it, eſpecially the White, which

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wanted, they may be raiſed in the ſame manner as the Sycamore, and managed accordingly.

3. ACER *(Negundo)* foliis compoſitis, floribus racemoſis. Hort. Cliff. 144. *The Virginia Aſh-leaved Maple.* Acer maximum, foliis trifidis vel quinquefidis, Virginianum. Pluk. Alm.

This is a quick grower, arrives to a large timber-tree, and is admirably adapted to cauſe a beautiful variety in our woods, though it is not proper to be planted in expoſed places, the branches being ſubject to ſplit when attacked by violent winds. The leaves are of a pale green colour, moderately large, and fall off pretty early in the autumn.——The timber is extremely uſeful for turners; and, like the Norway Maple, ſerves all the purpoſes of the Sycamore.——It is propagated by ſaving the keys, which this tree, though a native of Virginia, perfects in our country.—It is alſo propagated by layers, or by planting the cuttings, in a moiſt ſituation, in the autumn.

4. ACER *(Platanoides)* foliis quinquelobis acuminatis acutè dentatis glabris, floribus corymboſis. Lin. Flor. Suec. 303. *The Norway Maple with Plane-tree leaves.*

This Maple will grow to a great timber-tree, and therefore ſhould be raiſed to encreaſe the variety in our plantations. The leaves are of a ſhining green colour, look beautiful all ſummer, and die to a golden yellow in the autumn. This tree perfects its ſeeds with us; ſo that it may be raiſed in the ſame manner as the Sycamore, from the keys. It may be alſo propagated by layers and by cuttings; which, if planted in a moiſt ſoil in the autumn, will grow. Theſe ſhould be ordered in the nurſery-way, as was before directed, and managed till they are of a ſufficient ſize to be planted out for good.——Theſe trees being ſcarce, have been hitherto ſeldom planted, unleſs in wilderneſs-quarters for ornament. But as it is a very quick grower, arrives at a great bulk, and anſwers all the purpoſes of the Sycamore, the raiſing it, even for this uſe, as well as ornament and variety

" is wonderfully beautiful; this is called the French Maple, and grows in " that part of Italy that is on the other ſide of the Po beyond the Alps; " the other has a curled grain, ſo curiouſly maculated, that, from a near " reſemblance, it was uſually called the Peacock's Tail." He goes on to commend that of Iſtria, and that growing on the mountains, for the beſt: In the next chapter, he ſays, *Pulcherrimum vero eſt Bruſcum, multoque excellentius etiamnum Molluſcum. Tuber utrumque arboris ejus: Bruſcum intorſius criſpum: Molluſcum ſimplicius ſparſum. Et ſi magnitudinem menſarum caperet, haud dubie præferretur Cedro. Nunc intra pugillares, lectorumque ſilicios, aut laminas, raro uſu ſpectatur. E Bruſco fiunt et menſæ nigreſcentes.* lib. xvi. cap. xv. xvi. " The Bruſcum, or Knur, is wonderfully fair, but the " Molluſcum is counted moſt precious; both of them knobs and ſwellings

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ſhould not be neglected.—The Norway Maple is reckoned among our beſt trees for ſheltering habitations.

5. ACER *(Rubrum)* foliis quinquelobis ſubdentatis ſubtus glaucis, pedunculis ſimpliciſſimis aggregatis. Lin. Sp. Plant. 1496. *The ſcarlet-flowering Maple of Virginia.* Acer Virginianum folio majore, ſubtus argenteo ſupra viridi ſplendente. Pluk. Alm. 7.

Of this there are two ſorts; 1. Virginian Scarlet-flowering Maple; and, 2. Sir Charles Wager's Maple. Both of theſe are propagated for the ſake of the flowers, which are of a ſcarlet colour, and come out early in the ſpring. The leaves are compoſed each of five ſharp-pointed lobes, which are ſlightly indented or ſerrated: They are ſmooth, of a pale green on their upper ſurface, glaucous underneath; and they grow on long, ſimple, taper, reddiſh foot-ſtalks. The flowers come out in cluſters from the ſide of the branches; and the botanic characters, which follow their titles, indicate their ſtructure. They appear in April, and the ſeeds ripen in June. The ſort called Sir Charles Wager's produces larger cluſters or flowers than the others; on which account it is in moſt eſteem.

6. ACER *(Saccharinum)* foliis quinquepartito-palmatis acuminato-dentatis. Lin. Sp. Plant. 1496. *The American Sugar Maple.*

This has ſome reſemblance to the Norway Maple when the plants are young; but as they grow up the leaves are more deeply divided, and their ſurfaces leſs ſmooth, ſo that they are then eaſily diſtinguiſhed. From this tree the inhabitants of North-America make a very good ſort of ſugar, in large quantities, by tapping the trees early in the ſpring, and boiling the juice, which, by the uſual proceſs, is converted into ſugar. I am of opinion, that the people in America make ſugar from more than one ſort of Maple; for I have found that the Aſh-leaved Maple abounds with a ſaccharine juice, in as great plenty as any other ſort. Mr. Ray and Dr. Liſter prepared a tolerable ſort of ſugar from our greater Maple, by tapping the trees in their bleeding ſeaſon; and I have obſerved, upon cutting off

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" out of the tree. The Bruſcum is more intricately criſped, the Molluſ-
" cum not ſo much; and had we trees large enough to ſaw into planks for
" tables, it would be preferred before Cedar (or Citron, for ſo ſome copies
" read it); but now they uſe it only for ſmall table-books, and, with
" its thin boards, to wainſcot bed-teſters with. The Bruſcum is of a
" blackiſh kind, with which they make tables." Thus far Pliny.—And ſuch ſpotted tables were the famous Tigrin and Pantherine curioſities; not ſo called from being ſupported with figures carved like thoſe beaſts, as ſome conceive, and was in uſe even in our grandfathers' days, but from the natural ſpots and maculations; *Hem, quantis facultatibus æſtimavere ligneas maculas!* as Tertullian cries out, de Pallio, cap. v. Such a table was that of Cicero, which coſt him ten thouſand ſeſterces; ſuch another had Aſinius

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branches from the Scarlet Maple in February, a great quantity of a very ſweet juice hath flowed out for ſeveral days together

7. ACER *(Penſylvanicum)* foliis trilobis acuminatis ſerrulatis, floribus racemoſis. Duham. Arb. *The Mountain Maple of America.*

The body of this tree is ſlender, and is covered with a whitiſh bark. It ſends forth ſeveral red branches, and grows about fifteen feet high. The leaves are three-lobed, pointed, and are unequally and ſharply ſerrated The flowers come out in longiſh bunches in the ſpring; they are of a greeniſh yellow colour, and are ſucceeded by ſeeds which (like thoſe of the Norway Maple) generally fall off before they are ripe.

8. ACER *(Opalus)* foliis lobatis, minimè inciſis, fructu racemoſo. *The Italian Maple*, commonly called *Opalus*. Acer majus folio rotundiore minùs laciniato & Opalus Italorum. Raii Hiſt.

This is very common in moſt parts of Italy, but particularly about Rome, where it is one of the largeſt trees of that county, and is eſteemed for the ſize of the leaves, which are large, affording a great ſhade; ſo that theſe trees are frequently planted by the ſides of roads, and near habitations. In England this tree is very rarely to be met with, though it is hardy enough to bear the open air; but as the ſeeds have not been brought over till lately, there are no large plants in the Engliſh gardens at preſent.

9. ACER *(Monſpeſſulanum)* foliis trilobis integerrimis glabris Prod. Leyd. 459. *The Montpelier Maple.* Acer trifolium. C. B. P. 431.

The Montpelier Maple grows to about twenty feet high, and is a very beautiful tree. The leaves are compoſed of three lobes, are of a ſhining green, a thickiſh ſubſtance, and retain their verdure later in the year than moſt of the other ſorts. The flowers come out in the ſpring, but have very little beauty; their blow is

Gallus. That of King Juba was ſold for fifteen thouſand, and another, which I read of, valued at an hundred and forty thouſand, H. S. which, at about threepence ſterling, arrives to a pretty ſum; and yet that of the Mauritanian Ptolemie was far richer, containing four feet and an half diameter, three inches thick, which is reported to have been ſold for its weight in gold: Of that value they were, and ſo madly luxurious the age, that when they at any time reproached their wives for their wanton expenſiveneſs in pearl and other rich trifles, they were wont to retort, and turn the CH. XII.

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ſoon over, and ſometimes they are ſucceeded by ſeeds which come to perfection in our gardens.

10. ACER *(Creticum)* foliis trilobis integerrimis ſubtus pubeſcentibus. *Cretan Maple with three entire lobes to the leaves, which are ſomewhat hairy on their under-ſide.*

This grows to about the height of the former. The leaves are downy, compoſed of three lobes, and grow oppoſite to each other on long downy foot-ſtalks. The flowers come out in the ſpring, and are very ſeldom ſucceeded by good ſeeds in England.

The Maple, in the Linnæan Syſtem, is of the claſs and order *Polygamia Monoecia.*

I have already obſerved that the common Maple and Sycamore are beſt raiſed from ſeed; but as the ſeeds of the foreign kinds do not ripen in this country, they ſhould be procured from abroad.——In a cool and ſhady part of the ſeminary let beds of fine mould be marked out about four feet in breadth, and with proper alleys. Upon theſe let the foreign ſeeds be regularly ſown, ſifting over them about half an inch of the fineſt mould. When the plants come up, they ſhould be kept clean from weeds, and frequently watered; and this work muſt be duly attended to all ſummer. The ſpring following, the ſtrongeſt may be drawn out, and planted in the nurſery, in rows two feet aſunder, and at the diſtance of a foot from each other in the rows, leaving the others in the ſeminary to gain ſtrength. The ſucceeding ſpring they muſt receive the ſame culture; and they may remain in the nurſery, with no other trouble than keeping the ground clean from weeds in the ſummer, digging between the rows in the winter, and taking off all ſtrong and irregular ſide-ſhoots, till they are planted out for good.

Notwithſtanding theſe are the general laws of raiſing all the ſpecies of Maple from foreign ſeeds, the culture varies with reſpect to the Scarlet-flowering kind, when the ſeeds are gathered at home. This ſpecies brings its ſeeds to maturity the beginning of Jun. in our gardens. They ſhould be then gathered, and after having lain a few days to harden, they ſhould be ſown in beds of the fineſt mould, and covered only a quarter of an inch deep. The beds ſhould be hooped, and covered with mats in ſcorching weather; but when it is rainy and cloudy they ſhould always be uncovered. In about a month or ſix weeks many of the plants will appear; but the

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tables upon their huſbands. The knot of the timber was the moſt eſteemed, and is ſaid to be much reſembled by the Female Cypreſs: We have now, I am almoſt perſuaded, as beautiful planks of ſome Walnut-trees near the root; and of Yew, Ivy, Roſewood, Aſh, Thorn, and Olive, I have ſeen incomparable pieces, but the great art was in the ſeaſoning and poliſture; for which laſt, the rubbing with a man's hand, who came warm out of the bath, was accounted better than any cloth, as Pliny reports. Some there be who contend, this Citron was a part near the root of the Cedar, which, as they deſcribe it, is oriental and very odoriferous; but moſt of the learned favour the Citron, and that it grew not far from our Tangier.

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far greateſt part will not come up till the following ſpring. When the ſummer-plants firſt ſhew themſelves, they ſhould hardly ever feel the full beams of the ſun. The ſeeds muſt be conſtantly covered with the mats in the day-time, unleſs cloudy and rainy weather happens, when they ſhould always be uncovered; during the night no mats muſt be put over the plants, that they may have all the benefit of the refreſhing dews, air, and cooling ſhowers. When theſe latter do not fall, watering muſt be duly attended to; and this is all the trouble they will require for the firſt ſummer in the ſeed-bed. The ſummer following they may be expoſed to all weather, when they will only require being kept clean from weeds, and watered in dry ſeaſons. The ſucceeding ſpring the ſtrongeſt may be ſet out in the nurſery-way, like the former ſeedlings.

By layers alſo all the ſpecies of this genus may be propagated; though that method is never practiſed for the Common Maple and the Sycamore. The young ſhoots may be laid down in the autumn, winter, or early in the ſpring. By the autumn following they will have ſtruck root, and become good plants; when the ſtrongeſt ſhould be ſet out in the places where they are to remain; whilſt the weakeſt may be planted in the nurſery, like the ſeedlings, for a year or two, to gain ſtrength.

Maples raiſed from ſeeds will grow faſter, and arrive at greater height, than thoſe raiſed from layers; but they will not produce ſuch quantities of flowers; which makes the latter method more eligible for thoſe who want theſe plants for a low ſhrubbery.

By cuttings alſo theſe trees may be propagated: But this method is chiefly practiſed on the Aſh-leaved and Norway Maples, which more readily take root this way.—The cuttings ſhould be the bottom parts of the laſt year's ſhoots: They ſhould be taken off early in October, and planted in rows in a moiſt ſhady place. The ſpring and ſummer following they muſt be duly watered as often as dry weather makes it neceſſary, and be kept clean from weeds. By the autumn they will be fit to remove into the nurſery; though if the cuttings are not planted too cloſe, they may remain in their ſituation for a year or two longer, and then be ſet out for good, without the trouble of previouſly planting them in the nurſery.

Maples may likewiſe be propagated by budding, grafting, and inarching: But the other method being more eligible, theſe are never practiſed, except for the variegated ſorts, eſpecially the large broad-leaved kind. This latter is to be continued no other-

about the foot of Mount Atlas, whence haply ſome induſtrious perſon might procure of it from the Moors; and I did not forget to put his then Excellency my Lord H. Howard (ſince his Grace the Duke of Norfolk) in mind of it; who I hoped might have opportunities of ſatisfying our curioſity, that by comparing it with thoſe elegant woods, which both our own Countries and the Indies furniſh, we might pronounce ſomething in the controverſy: But his not going ſo far into the country, and the diſorder which happened at his being there, quite fruſtrated this expectation. Here I think good to add, what honeſt Paliſſy philoſophiſes, after his plain manner, about the reaſon of thoſe pretty undulations and chamfers, which we ſo frequently find in divers woods, which he takes to be the deſcent, as well as aſcent of moiſture: For what elſe, ſays he, becomes of that

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wiſe than by budding it on ſtocks of the Common Sycamore; for the ſeeds, tho' ſo large themſelves, when ſown afford us only the Common Sycamore in return.

In order to propagate the varieties by budding, let ſome plants of the Common Sycamore, one year old, be taken out of the ſeminary, and ſet in the nurſery in rows a yard aſunder, and the plants about a foot and half diſtance from each other in the rows: Let the ground be kept clean from weeds all ſummer, and be dug, or, as the gardeners call it, *turned in*, in the winter; and the ſummer following the ſtocks will be of a proper ſize to receive the buds, which ſhould be taken from the moſt beautifully-ſtriped branches. The beſt time for this work is Auguſt; becauſe if it is done earlier, the buds will ſhoot the ſame ſummer; and when this happens, a hard winter will infallibly kill them. Having, therefore, budded your ſtocks the middle or latter end of Auguſt, with the eyes or buds fronting the north, early in October take off the baſs matting, which before this time will have confined the bark and pinched the bud, but not ſo as to hurt it much. Then cut off the ſtock juſt above the bud, and dig the ground between the rows. The ſummer following, keep the ground clean from weeds; cut off all natural ſide-buds from the ſtock as they come out; and by autumn, if the land be good, your buds will have ſhot forth, and formed themſelves into trees five or ſix feet high. They may be then removed into the places where they are deſigned to remain; or a few of them only may be drawn out, leaving the others to be trained up for larger ſtandards, to ſerve for planting out in open places, or ſuch other purpoſes as ſhall be wanted.

The Striped Norway Maple ſhould be budded on ſtocks of its own kind; for on theſe they take beſt, and both kinds are not very liable to run away from their colours. Variegated plants in general muſt be planted in poor, hungry, gravelly, or ſandy ſoils, to feed the diſeaſe which occaſions theſe beautiful ſtripes, and cauſe it to be more powerful; but theſe trees ſhew their ſtripes in greater perfection in a good ſoil: The plant, though in ſickneſs, has the appearance of health; the ſhoots are vigorous and ſtrong; the leaves are large, leſs liable to be hurt by inſects; and the ſtripes appear more perfect, natural, and delightful, than thoſe on ſtunted trees growing on a poor ſoil.

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water which we often encounter in the cavities, when many branches divaricate, and ſpread themſelves at the tops of great trees, eſpecially Pollards, unleſs, according to its natural appetite, it ſink into the very body of the ſtem through the pores? For example; in the Walnut, you ſhall find, when it is old, that the wood is admirably figured, and, as it were, marbled; and therefore much more eſteemed by the joiners, cabinet-makers, inlayers, &c. than the young, which is paler of colour, and without any notable grain, as they call it: For the rain diſtilling along the branches, when many of them break out into cluſters from the ſtem, ſinks in, and is the cauſe of theſe marks, ſince we find it exceedingly full of pores: Do but plane off a thin chip, or ſliver, from one of theſe old trees, and interpoſing it betwixt your eye and the light, you ſhall obſerve it to be full of innumerable holes (much more perſpicuous and ample by the application of a good microſcope*.) But above all, notable for theſe extravagant damaſkings and characters, is the Maple; and it is notorious that this tree is very full of branches from the root to its very ſummit, by reaſon that it produces no conſiderable fruit: Theſe arms being frequently cut, the head is more ſurcharged with them, which ſpreading like ſo many rays from a centre, form that hollowneſs at the top of the ſtem whence they ſhoot, capable of containing a good quantity of water every time it rains; this ſinking into the pores, as was before hinted, is compelled to divert its courſe as it paſſes through the body of the tree, wherever it encounters the knot of any of thoſe branches which were cut off from the ſtem; becauſe their roots not only deeply penetrate towards the heart, but are likewiſe of themſelves very hard and impervious; and the frequent obliquity of this courſe of the ſubſiding moiſture, by reaſon of theſe obſtructions, is, as may be conceived, the cauſe of thoſe curious works which we find remarkable in this and other woods, whoſe branches grow thick from the ſtem. But for theſe curious contextures, conſult rather the learned Dr. Grew. We have ſhewed how by culture, and ſtripping up, it arrives to a goodly tree; and ſurely there were ſome of them of large bulk, and noble ſhade, that Virgil ſhould chooſe it for the court of his Evander (one of his worthieſt Princes, in his beſt of poems) ſitting in his Maple-throne*; and when he brings Æneas into the Royal Cottage,

* Not invented in Paliſſy's days.

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* —— Solioque invitat acerno. Æn. viii.

he makes him this memorable compliment: Greater, ſays great Cowley, than ever was yet ſpoken at the Eſcurial, the Louvre, or Whitehall. CH. XII.

——————Hæc, inquit, limina victor
Alcides ſubiit; hæc illum regia cepit.
Aude, hoſpes, contemnere opes, et te quoque dignum
Finge Deo, rebuſque veni non aſper egenis.

This humble roof, this ruſtick court, ſaid he,
Receiv'd Alcides crown'd with victory:
Scorn not, great gueſt, the ſteps where he has trod,
But contemn wealth, and imitate a God.

The Savages in Canada, when the ſap riſes in the Maple, by an inciſion in the tree extract the liquor; and having evaporated a reaſonable quantity thereof (as ſuppoſe ſeven or eight pounds) there will remain one pound as ſweet and perfect ſugar as that which is gotten out of the cane; part of which ſugar has been for many years conſtantly ſent to Rouen in Normandy to be refined: There is alſo made of this ſugar an excellent ſyrup of Maiden-hair and other capillary plants, prevalent againſt the ſcurvy; tho' Mr. Ray thinks otherwiſe, by reaſon of the ſaccharine ſubſtance remaining in the decoction. See Synopſ. Stirp. & Dendrolog. de Acere.

CHAP. XIII.

The SYCAMORE *.

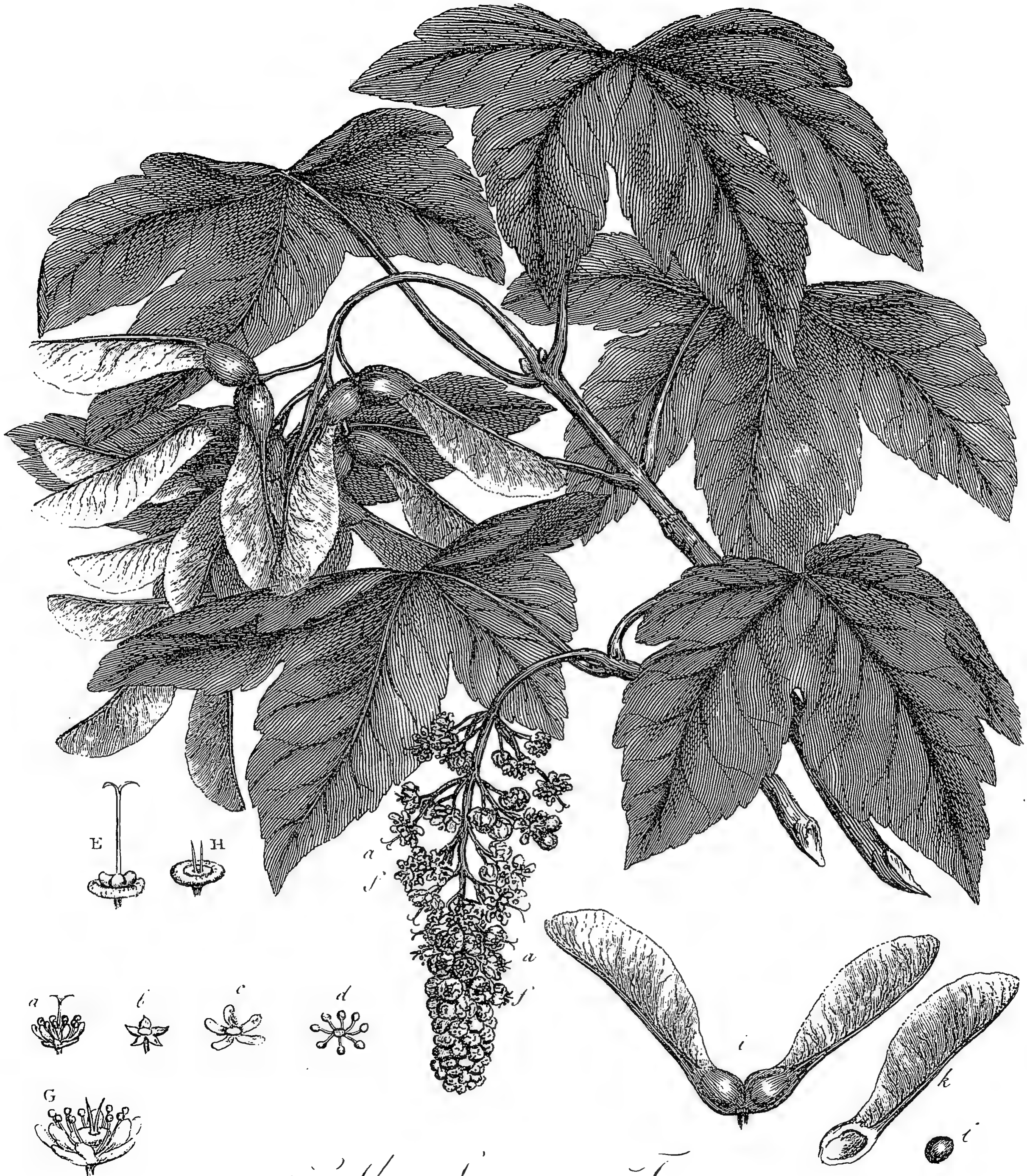
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1. THE SYCAMORE, or Wild Fig-tree, falſely ſo called, is our Acer majus, or broad-leaved Mas, one of the Maples, and is much more in reputation for its ſhade than it deſerves; for the Honey-dew leaves, which fall early, like thoſe of the Aſh, turn to mucilage and noxious inſects, and putrefy with the firſt moiſture of the ſeaſon, ſo as they contaminate and marr our walks; and are therefore, by my conſent, to be baniſhed from all curious gardens and avenues. It is raiſed of the keys in the huſk, as ſoon as ripe, and they come up the firſt ſpring; alſo by roots and layers, in ground moiſt, not over wet or ſtiff, and muſt be governed as other nurſery plants.

2. There is in Germany a better ſort of Sycamore than ours (nor are ours indigenous) wherewith they make ſaddle-trees, and divers other things of uſe. Our own is excellent for trenchers, cart and plow-timber, being light, tough, and not much inferior to Aſh itſelf; and if the trees be very tall and handſome, they are the more tolerable for diſtant walks, eſpecially where other better trees proſper not ſo well, or where a ſudden ſhade is expected: Some commend them to thicken copſes, eſpecially in parks, as leaſt apt to the ſpoil of deer, and that it is good fire-wood. This tree being wounded, bleeds a great part of the year; the liquor emulating that of the Birch, which happening to few of the reſt (that is, to bleed winter and ſummer) I therefore mention: The ſap is ſweet and wholeſome, and in a ſhort time yields ſufficient quantity to brew with, ſo as with one buſhel of malt is made as good ale as four buſhels with ordinary water, upon Dr. Tongue's experience. Phil. Tranſ. vol. iv. fol. 917.

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* This is the Acer *(Pſeudo-platanus)* foliis quinquelobis inæqualiter ſerratis, floribus racemoſis. Lin. Sp. Pl. 1495. And has already been deſcribed in the laſt chapter.



The Sycamore Tree.

Published January 1st 1805 by Vernor Hood & Sharpe Nº 45 St Pauls Church Yard.

J. Miller del. Sc.

Pl. 27



The Lime Tree.

Published June 1st 1794 by Harrison & Co as the Act directs.

J. Miller del et sculp.

CHAP. XIV.

The LIME *.

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1. TILIA, the Lime-tree, or Linden, is of two kinds; the male (which ſome allow to be but a finer ſort of Maple) is harder, fuller of knots, and of a redder colour, but producing neither flower nor ſeed, ſo conſtantly and ſo mature with us, as does the female, whoſe bloſſom is alſo very odoriferous, perfuming the air, and the leaf larger; the wood is likewiſe thicker, of ſmall pith, and not obnoxious to the worm; ſo as it ſeems Theophraſtus de Plant. lib. iii. cap. x. ſaid true, That though they were of both ſexes, yet they totally differed as to their form, διαφέρουσι δὲ τῇ μορφῇ τῇ ὅλῃ, &c. We ſend commonly for this tree into Flanders and Holland, which indeed grows not ſo naturally wild with us, to our exceſſive coſt, while our woods do in ſome places ſpontaneouſly produce them; and though of ſomewhat a ſmaller leaf, yet

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* Of this genus there are only two ſpecies.

1. TILIA *(Europæa)* floribus nectario deſtitutis. Lin. Sp. Pl. 733. *The Lime, or Linden-tree.*

The Common Lime and the Red-twigged Lime are varieties only of the ſame ſpecies, becauſe the ſeeds of one ſort will frequently produce the other. Thus, ſeeds gathered from the red-twigged trees frequently produce plants of the common ſort; and thoſe that have come up the true red-twigged kind, and have been raiſed and planted out as ſuch, have been found to run away from their colours, and change into the common green-twigged ſort.——The Lime is a handſome pictureſque tree, forming a beautiful cone by its branches, and maintaining its body taper and ſtraight; and, as it will grow to a large ſize, it is very proper to be planted for avenues, to terminate the bounds of lawns, and to make a variety in places deſigned for relaxation of mind. And although the leaves fall off very early in the autumn, yet it immediately makes amends for this by exhibiting its beautiful red twigs; for which reaſon the red-twigged Lime ſhould always be preferred for theſe purpoſes. It has alſo other properties to recommend itſelf to ſuch ſituations: The ſhade is excellent; the branches are ſo tough as ſeldom to be broke by the winds; and if any of them ſhould want occaſionally to be taken off, no tree heals its wounds ſooner. Notwithſtanding it will ſometimes run away from its colour, and grow with green branches, this is not often the caſe.——The Lime is beſt raiſed from ſeeds; for thoſe trees raiſed from layers or from cuttings

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altogether as good, and apt to be civilized and made more florid: From thence I have received many of their berries; ſo as it is a ſhameful negligence, that we are not better provided of nurſeries of a tree ſo choice and univerſally acceptable: For ſo they may be raiſed either of the ſeeds in October, or, with better ſucceſs, by the ſuckers and plants, which are treated after the ſame method, and in as great abundance as the Elm, like to which it ſhould be cultivated. You may know whether the ſeeds be prolific, by ſearching the huſk; if on biting, or cutting it aſunder, it be full and white, and not huſky, as ſometimes we find the foreigners, the ſeeds are good. Be ſure to collect your ſeed in dry weather, airing it in an open room, and reſerving it in ſand (as has been taught) till Mid-February, when you may ſow it in pretty ſtrong, freſh, and loamy mould, kept ſhaded and moiſt, as the ſeaſon requires, and clear of weeds; and at the period of two years plant them out, dreſſed and pruned, as diſcretion ſhall adviſe. But not only by the ſuckers and layers at the roots, but even by branches lopped from the head, may this tree be propagated; and peeling off a little of the bark, at a competent diſtance from the ſtem or arms, and covering it with loam mingled with rich earth, they will

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never grow ſo handſome, or ſo faſt, as thoſe raiſed in the ſeminary.——Let the ſeeds be gathered from thriving healthy trees of the true red-twigged kind, and then by far the greateſt part of the young plants will be of that ſort. The ſeeds being ripe in October, let a dry day be made choice of for gathering them. As theſe grow at the extremity of the branches, it would be tedious to gather them with the hand; they may therefore be beaten down by a long pole, having a large winnowing ſheet, or ſome ſuch thing, ſpread under the tree to receive them.——When you have got a ſufficient quantity, ſpread them in a dry place for a few days; then having procured a ſpot of rich garden-ground, and having the mould made fine by digging and raking, let it be raked out of the beds about an inch deep: Theſe beds may be four feet wide, and the alleys a foot and a half. After the mould is raked out, the earth ſhould be gently tapped down with the back of the ſpade, to make it level; then the ſeeds ſhould be ſown, at about an inch aſunder, all over the bed, gently preſſing them down, and covering them about an inch deep.——In the ſpring of the year the young plants will make their appearance; when they ſhould be conſtantly kept clean from weeds, and gently watered in very dry weather. In this ſeminary they may ſtand for two years, when they will be fit to plant in the nurſery; at which time they ſhould be carefully taken up, their roots ſhortened, and the young ſide-branches, if they have ſhot out any, taken off. They muſt be planted in the nurſery-ground in rows, two feet and a half aſunder, and one foot and a half diſtant in the rows. There they may ſtand till they are of proper ſize to be planted out for good; obſerving always

ſhoot their fibres, and may be ſeaſonably ſeparated: But, to facilitate this and the like attempts, it is adviſable to apply a ligature above the place when the ſap is aſcending, or beneath it when it (as they ſay vulgarly) deſcends. From June to November you may lay them; the ſcrubs and leſs erect do excellently to thicken copſes, and will yield luſty ſhoots and uſeful fire-wood.

2. The Lime-tree affects a rich feeding loamy ſoil; in ſuch ground its growth will be moſt incredible for ſpeed and ſpreading. It may be planted as big as one's leg, and its head topped at about ſix or eight feet bole; thus it will become, of all other, the moſt proper and beautiful for walks,

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to dig between the rows every winter, and conſtantly to keep the ground free from weeds. The Lime-tree will grow well on almoſt any ſort of ſoil or ſituation; but if planted in a rich and loamy earth, wherein, like moſt other trees, it chiefly delights, the growth of it will be almoſt incredible. This ſhould be a great motive to the planting of this tree; which will, in a very few years, ſufficiently reward the induſtrious planter.

2. TILIA *(Americana)* floribus nectario inſtructis. Kalm. *The American Lime-tree.* Of this ſpecies there are a few varieties, which indeed differ very little in appearance from thoſe of our common European ſorts, the leaves of both being heart-ſhaped.——There is a larger, and a ſmaller leaved ſort. Their edges are finely ſerrated, and end in acute points. Theſe beautifully cordated leaves, that thus run into acute points, have their under ſurface of a paler green than their upper. The larger-leaved kind is by far the fineſt ſort; and the branches vary from all others of this genus, in that they are covered with a dark-brown bark. The flowers excite no attention in the Gardener; but the Botaniſt is delighted when he finds they are furniſhed with nectaria; whereas the flowers of our common Lime-tree have none. The flowers are produced in bunches, like our common ſort, but make no better figure. They are very fragrant, and are ſucceeded by coriaceous capſules, containing the ſeeds.—The American ſorts, as well as our own, ſhould be raiſed from ſeeds; but when we have not the conveniency of procuring the ſeeds from abroad, a few plants muſt be obtained. Theſe ſhould be planted in a light rich ſoil, if ſuch can be had, for there they will ſhoot the ſtrongeſt; though almoſt any other will do. After theſe plants have ſtood a year or two, they ſhould be headed near the ground, for ſtools. They will then ſhoot out many young branches, which may be layered in the autumn; though if they ſtand two years there will be greater plenty of young twigs for layering; for every ſhoot of the firſt ſummer will the year following divide into ſeveral. When the layering of theſe is to be performed, which ought to be in the autumn, the ſtrong two-years ſhoots muſt be brought down; and if they are ſtiff and do not bend

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as producing an upright body, ſmooth and even bark, ample leaf, ſweet bloſſom, the delight of bees, and a goodly ſhade at the diſtance of eighteen or twenty-five feet. It is alſo very patient of pruning; but if it taper over much, ſome of the collateral boughs ſhould be cut off to check the ſap, which is beſt to be done about Midſummer; and to make it grow upright, take off the prepondering branches with diſcretion, and ſo you may correct any other tree, and redreſs its obliquity. The root, in tranſplanting, ſhould not be lopped; and this, ſays Mr. Cook, is a good leſſon for all young-planted trees.

3. The Prince Elector did lately remove very great Lime-trees out of one of his foreſts at Heidelberg, to a ſteep hill, exceedingly expoſed to the

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readily, they muſt have a gentle ſplaſh with the knife near the bottom; a ſlit ſhould be made at the joint for every one of the youngeſt twigs, and their ends bent backwards that the ſlit may be kept open. This being done, the mould muſt be levelled among the layers, and the ends of them taken off to within one eye of the ground. The buſineſs is then done; and the autumn following they will have all good roots, many of which will be ſtrong, and fit to plant out for good, whilſt the weakeſt may be removed into the nurſery-ground, in rows, to gain ſtrength. All the ſorts of Lime-trees will alſo grow from cuttings; but this I have ever found to be an uncertain method; and if it were more certain, ſtill plants raiſed either by them or layers are not near ſo good as thoſe from ſeeds, which way ought always to be practiſed where they can be obtained.

The Lime-tree is of the claſs and order *Polyandria Monogynia*, there being in every flower numerous ſtamina and one ſtyle only.

The flowers begin to open about the fifteenth of May, and are in full blow by the thirteenth of July, when they appear of a white colour, and have a very fragrant ſmell. The leaves begin to open about the twelfth of April, are quite out by the eighteenth of the ſame month, and fall off very early in the autumn.

The timber of the Lime-tree is uſed by the carvers, it being a ſoft light wood, as alſo by architects for framing the models of their buildings; the turners likewiſe uſe it for making light bowls, diſhes, &c. but it is too ſoft for any ſtrong purpoſes.

Theſe trees will continue growing, and remain ſound a great number of years, and, if planted in a good loamy ſoil, will grow to a conſiderable bulk. Mr. Miller meaſured a Lime which was near ten yards in girth two feet about the ground, and was then in a very thriving condition; and Sir Thomas Brown mentions one of theſe trees which grew in Norfolk, that was ſixteen yards in circuit a foot and a half above the ground, was thirty yards in height, and in the leaſt part of the trunk eight yards and a half.

heat of the ſun, and that in the midſt of ſummer: They grow behind that ſtrong tower on the ſouth-weſt and moſt torrid part of the eminence, being a dry, reddiſh, barren earth, yet do they proſper rarely well: But the heads were cut off, and the pits into which they were tranſplanted were (by the induſtry and direction of Monſieur De Son, a Frenchman, and an admirable mechanician, who himſelf related it to me) filled with a compoſition of earth and cow-dung, which was exceedingly beaten, and ſo diluted with water, as it became almoſt a liquid pap: It was into this that he plunged the roots, covering the ſurface with the turf: A ſingular example of removing ſo great trees at ſuch a ſeaſon, and therefore taken notice of here expreſsly. Other perfections of the tree, beſides its unparalleled beauty for walks, are, that it will grow in almoſt all grounds; that it laſts long; that it ſoon heals its ſcars; that it affects uprightneſs; that it ſtoutly reſiſts a ſtorm; that it ſeldom becomes hollow.

4. The timber of a well-grown Lime is convenient for any uſe that the willow is; but much to be preferred, as being ſtronger and yet lighter; whence Virgil calls them *Tilias leves* and therefore fit for yokes *. They are turned into boxes for the apothecaries.——Columella commends *Arculas Tiliaceas*. And becauſe of its colour and eaſy working, and that it is not ſubject to ſplit, architects make with it models for their deſigned buildings; and the carvers in wood uſe it not only for ſmall figures, but large ſtatues and entire hiſtories in baſs and high relieve; witneſs, beſides ſeveral more, the lapidation of St. Stephen, with the ſtructures and elevations about it; the trophies, feſtoons, fruitages, encarpia, and other ſculptures in the frontoons, friezes, capitals, pedeſtals, and other ornaments and decorations, of admirable invention and performance, to be ſeen about the choir of St. Paul's and other churches, royal palaces, and noble houſes in city and country, all of them the works and invention of our Lyſippus, Mr. Gibbons, comparable, and, for ought appears, equal to any thing of the antients. Having had the honour (for ſo I account it) to be the firſt who recommended this great artiſt to his Majeſty Charles II. I mention it on this occaſion with much ſatisfaction. With the twigs they make baſkets and cradles, and of the ſmoother ſide of the bark, tablets for writing; for the antient Philyra is but our Tilia, of which Munting affirms he ſaw a book made of the inward bark, written about a

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——— * et tilia ante jugo levis ———

Book I.

thouſand years ſince. Such another was brought to the Count of St. Amant, Governor of Arras, 1662, for which there were given eight thouſand ducats by the Emperor; it contained a work of Cicero, *De ordinanda Republica, & de inveniendis orationum exordiis*; —— a piece ineſtimable, but never publiſhed, and now in the library at Vienna, after it had formerly been the greateſt rarity in that of the late Cardinal Mazarine. Other papyraceous trees are mentioned by Weſt-Indian travellers, eſpecially in Hiſpaniola, Java, &c. whoſe inward bark not only exceeds our largeſt paper for breadth and length, and may be written on on both ſides, but is comparable to our beſt vellum. Bellonius ſays, That the Grecians made bottles of the Tilia, which they finely roſined within-ſide. It makes pumps for ſhips, alſo lattices for windows: Shoemakers uſe dreſſers of the plank to cut leather on, as not ſo hard as to turn the edges of their knives; and even the coarſeſt membrane, or ſlivers of the tree growing betwixt the bark and the main body, they now twiſt into baſs-ropes; beſides, the truncheons make a far better coal for gun-powder than that of Alder itſelf: Scriblets for painters firſt draughts are alſo made of its coals; and the extraordinary candor and lightneſs has dignified it above all the woods of our foreſt, in the hands of the Right Honourable the White-ſtaff Officers of his Majeſty's Imperial Court. The royal plantations of theſe trees in the parks of Hampton-Court and St. James's will ſufficiently inſtruct any man how theſe (and indeed all other trees which ſtand ſingle) are to be governed and defended from the injuries of beaſts, and ſometimes more *unreaſonable* creatures, till they are able to protect themſelves. In Holland, where the very highways are adorned with them, they frequently clap three or four deal-boards, in manner of a cloſe trunk, about them, but it is not ſo well; becauſe it keeps out the air, which ſhould have free acceſs and intercourſe to the bole, and by no means be excluded from flowing freely about them, or indeed any other trees, provided they are ſecured from cattle, and the violence of impetuous winds, &c. as his Majeſty's are, without thoſe cloſe coffins in which the Dutchmen ſeem rather to bury them alive: In the mean time, is there a more raviſhing or delightful object, than to behold ſome entire ſtreets and whole towns planted with theſe trees, in even lines before their doors, ſo as they ſeem like cities in a wood? This is extremely freſh, of admirable effect againſt the epilepſy, for which the delicately-ſcented bloſſoms are held prevalent, and ſkreen the

houſes both from winds, ſun, and duſt; than which there can be nothing more deſirable where ſtreets are much frequented: For thus CH. XIV.

Stat Philyra; haud omnes formoſior altera ſurgit
Inter Hamadryades; molliſſima, candida, lævis,
Et viridante comâ & beneolenti flore ſuperba,
Spargit odoratam latè, atque æqualiter umbram.

COULEII lib. vi. *Pl.*

The ſtately Lime, ſmooth, gentle, ſtraight, and fair,
(With which no other Dryad may compare)
With verdant locks, and fragrant bloſſoms deckt,
Does a large, even, odorate ſhade project.

Diræ and curſes therefore on thoſe inhuman and ambitious tyrants, who, not contented with their own dominions, invade their peaceful neighbour, and ſend their legions, without diſtinction, to deſtroy and level to the ground ſuch venerable and goodly plantations, and noble avenues. Irreparable marks of their barbarity!

The diſtance for walks, as we ſaid, may, in rich ground, be twenty-five feet; in more ordinary ſoil, eighteen or twenty. For a moſt prodigious tree of this kind, ſee book iii. chap. iii.

The berries, reduced to powder, cure the dyſentery, and ſtop bleeding at the noſe. The diſtilled water is good againſt the epilepſy, apoplexy, vertigo, trembling of the heart, and gravel. Schroder commends a mucilage of the bark for wounds, *repellens urinam, & menſes ciens, &c.* And I am told the juice of the leaves fixes colours.

CHAP. XV.

The POPLAR, ASPEN, *and* ABELE *.

Book I. 1. POPULUS, the Poplar. I begin this ſecond claſs, according to our former diſtribution, with the Poplar, of which there are ſeveral kinds, White, Black, &c. (which in Candy it is reported bears ſeed) beſides the Aſpen. The White (famous heretofore for yielding its umbram hoſpitalem) is the moſt ordinary with us, to be raiſed in abundance by every ſet or ſlip. Fence the ground as far as any old Poplar roots extend, and they will furniſh you with ſuckers innumerable, to be ſlipped from their mothers, and tranſplanted the very firſt year; but if you cut down an old tree, you ſhall need no other nurſery. When they are young, their leaves are ſomewhat broader and rounder, as moſt other trees are, than when they grow aged. In moiſt and boggy places they will flouriſh wonderfully, ſo the ground be not ſpewing; but eſpecially near the margins and banks of rivers [*Populus in fluviis*———] and in low, ſweet, and fertile grounds, yea, and in the drier likewiſe. Truncheons of ſeven or eight feet long,

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* The Poplar is the moſt valuable of all the aquatics, whether we conſider the quickneſs of its growth, or the magnitude to which it will arrive: And although this tree is ſtiled an Aquatic, yet it will grow exceeding well, and attain an extraordinary bulk in a few years, on ground tolerably dry.

There are many ſpecies of the Poplar, though I ſhall recommend only three to be planted for timber-trees. Theſe are, the White Poplar, known by the name of the Abele-tree; the Black Poplar, ſo called from a black circle perceived at the centre of its trunk when felled; and the Trembling Poplar, or Aſpen-tree.

1. POPULUS (*Alba*) foliis ſubrotundis, dentato-angulatis ſubtus tomentoſis. Hort. Cliff. 460. *Poplar-tree with roundiſh angular leaves, which are downy on their under ſide.* Populus alba majoribus foliis. C. B. P. 429. *White Poplar with larger leaves,* commonly called the *Abele-tree.*

2. POPULUS (*Nigra*) foliis deltoidibus acuminatis ſerratis. Hort. Cliff. 460. *Poplar with pointed ſawed leaves, ſhaped like the Delta.* Populus nigra. C. B. P. 429. *Black Poplar.*

3. POPULUS (*Tremula*) foliis ſubrotundis, dentato-angulatis utrinque glabris. Hort. Cliff. 460. *Poplar-tree with roundiſh leaves, which are angularly indented, and ſmooth on both ſides.* Populus tremula. C. B. P. 429.

The flowers of thi tree are male and female, on diſtinct plants, and the male flowers have eight ſtamina, which ſhews it to belong to the claſs and order *Dioecia Octandria.* The male and female flowers are both arranged into an amentum. In the



The White Poplar Tree.

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J. Miller del. & sc.

thruſt two feet into the earth, (a hole being made with a ſharp hard ſtake, filled with water, and then with fine earth preſſed in, and cloſe about them) when once rooted, may be cut at ſix inches above ground; and thus placed at a yard diſtant, they will immediately furniſh a kind of copſe: But in caſe you plant them of rooted trees, or ſmaller ſets, fix them not ſo deep; for though we bury the truncheons thus profound, yet is the root which they ſtrike commonly but ſhallow. They will make prodigious ſhoots in fifteen or ſixteen years; but then the heads muſt by no means be diminiſhed, but the lower branches may, yet not too far up; the foot ſhould alſo be cleanſed every ſecond year: This for the White. The Black Poplar is frequently pollared, when as big as one's arm, eight or nine feet from the ground, as they trim them in Italy for their Vines to ſerpent and twiſt on, and thoſe they poll, or head, every ſecond year, ſparing

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beginning of April they make their appearance; though the Aſpen flowers will be full blown by the twenty-ſecond of March. The male flowers appear firſt, and the female about a week after. The catkins are about three inches long. Soon after the female flowers come out, the males drop off the tree; and in about five or ſix weeks the female will have ripe ſeeds, which are ſometimes diſperſed by the winds to a conſiderable diſtance.

The trunk of the White Poplar is ſtraight, and covered with a ſmooth whitiſh bark. The leaves are about three inches long, and ſtand upon foot-ſtalks about an inch in length: they are indented at the edges; are of a dark green on the upper ſurface, but white and woolly underneath. They are uſually quite out by the eighteenth of April.

The leaves of the Black Poplar are not ſo large as the former; their colour is a pleaſant green; they are heart-ſhaped, and appear about the twenty-ſecond of April.

The leaves of the Aſpen are ſmaller than thoſe of the Black Poplar. They ſtand upon long ſlender foot-ſtalks, which renders it, of all the other ſorts, the moſt tremulous; are roundiſh, and ſmooth on both ſides; but do not make their appearance before the beginning of May.

The propagation of the Poplar-tree is very eaſy. It will grow from cuttings, ſuckers, and truncheons; tho' I by no means approve of the planting of truncheons, as often practiſed on boggy places; becauſe I have always obſerved, that plantations of theſe luxuriant trees, attempted to be raiſed in this manner, have been frequently ſtocked; and that the moſt promiſing trees have never equalled, in goodneſs or beauty, ſuch as had been raiſed in the nurſery.

In order, therefore, to obtain a quantity of Poplars, proper to be planted in avenues or clumps, by the ſides of rivulets, bogs, or any other places where they are deſired, you muſt get a piece of ground double dug for the nurſery. If the trees wanted are to be planted for good in a watery ſituation, this nurſery-ground ſhould be pretty near it;

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the middle, ſtraight, and thrivingeſt ſhoot, and at the third year cut him alſo. There be yet that condemn the pruning of this Poplar, as hindering its growth.

2. The ſhade of this tree is eſteemed very wholeſome in ſummer, but they do not become walks or avenues, by reaſon of their ſuckers, and that they foul the ground at the fall of the leaf; but they ſhould be planted in barren woods, and to flank places at diſtance for their increaſe, and the glittering brightneſs of their foliage: The leaves are good for cattle, which muſt be ſtripped from the cut boughs before they are faggoted.

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but if they are deſigned for paſture-grounds, fields, or ſuch as have no more than a common degree of moiſture, the ſoil of the nurſery ſhould be proportionably drier.

Spring is the beſt ſeaſon for planting the cuttings; though they will grow if planted in any of the winter months. They ſhould all be vigorous ſhoots of the laſt year, or at leaſt not older than two years. Theſe cuttings ſhould be one foot and a half in length; and muſt be planted in the nurſery-ground in rows, a yard aſunder, and at a foot and a half diſtance from one another. They ſhould be planted a foot in the ground, and the other part ſhould remain above to ſend forth the leading-ſhoot. Now, in order to have one leading-ſhoot only, the plants ſhould be carefully looked over in ſummer, and all young ſide-branches nipped off, in order to encourage the leading branch. After this, no farther care need be taken of them than keeping them clean of weeds, and digging between the rows in the winter, till they have attained a proper ſize to plant out for good, which will be in two years, if they are deſigned to form ſmall woods, or ſpinneys, in boggy or watery grounds.

If they are wanted for ſtandards, for fields, ſides of rivers, &c. they may remain in the nurſery another year, when they will not be too large for that purpoſe, but may be taken out and planted; and in a few years they will make a ſurpriſing progreſs, ſo as to be worth, in about twenty or thirty years, as many ſhillings, or more, a-piece.

In order to form a coppice of theſe trees, if the land be not ſo boggy but that it may be plowed, a crop of oats or other grain may be got off it the preceding year of planting; and in the autumn it would be a ſtill greater advantage, if, juſt before the planting, it was to be plowed again; as by this operation it would be rendered lighter, and the weeds, &c. would be buried. Having prepared the ground, let the two-year old plants be taken out of the nurſery, and planted one yard aſunder. It will be proper to continue hoeing the weeds down for the firſt year: Afterward, they will require no farther trouble till the time of cutting, which may be done in ſeven years from the firſt planting; and every four or five years after they may be cut for poles, fire-wood, &c. The quickneſs of the growth of theſe trees, and their value when cut, even for theſe purpoſes, greatly augment the value of the land planted with them: Nay, by this means boggy or marſhy ground will produce more per acre than the beſt paſture or feeding land; a conſideration which ſhould ſtimulate every Gentleman poſſeſſed of a large quantity of ſuch ſort of land, which brings him in very little, to im-

This to be done in the decreaſe of October, and reſerved in bundles for winter fodder. The wood of the White Poplar is ſought of the ſculptor, and they ſaw both ſorts into boards, which, where they lie dry, continue a long time. Of this material they alſo made ſhields of defence in ſword and buckler days. Dioſcorides writes, that the bark chopped ſmall, and ſowed in rills, well and richly manured and watered, will produce a plentiful crop of Muſhrooms; or warm water, in which yeſt is diſſolved, caſt upon a new-cut ſtump. It is to be noted that thoſe fungi, which ſpring from the putrid ſtumps of this tree, are not venenous, (as of all or moſt other trees they are) being gathered after the firſt autumnal rains. There is a Poplar of a paler green, and is the propereſt for watery ground; it will grow of truncheons from two to eight feet

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prove it in this manner; and the improvement will be the greater, in proportion as the ſcarcity of wood in his neighbourhood is greater or leſs. If the ground for theſe plantations be ſo boggy as not to admit of plowing and ſowing, then the planter muſt be contented with taking the plants out of the nurſery, and ſetting them in holes at the aforeſaid diſtance; and they will thrive ſurpriſingly even in this way.

Every Gentleman deſirous of having plantations of large trees of the ſorts I have recommended, ſhould plant them as before directed, at one yard aſunder; and when their heads begin to interfere and incommode one another, every other tree ſhould be taken away, which will ſell for large poles; and the remainder ſhould be left to grow for timber. But though I adviſe every other tree to be taken away, I would not have this caution too ſtrictly obſerved: I only mean to have the weakeſt and leaſt thriving eradicated; and if two fine luxuriant trees ſtand together, and others leſs promiſing on each ſide, let the weakeſt be taken up. And thus they ſhould continue to be thinned as often as they grow too cloſe, till you have a plantation of timber Poplar-trees.

I muſt not forget to give another precaution to the Poplar planter, viz. That after theſe trees are planted out for good, he ſhould never ſuffer a tree to be ſtripped up, nor even a ſide-branch taken off; for by doing this, the progreſs of the tree will be ſtopped for ſome years; whereas, if theſe are permitted to remain, they will powerfully attract the nutritious juices, and help to ſupply the trunk, as well as themſelves, in ſuch plenty, as to contribute ſurpriſingly to the increaſe of the tree.

4. POPULUS *(Balſamifera)* foliis ſubcordatis denticulatis. Hort. Cliff. 460. *The Carolina Poplar.*

This Poplar grows to a large timber-tree, and has a peculiar majeſty. It is an exceeding ſwift grower, inſomuch that I have known it ſhoot ten feet in the ſpace of one ſummer, and to grow in thickneſs, neareſt the baſe, an inch in diameter. The bark is ſmooth, and of a whitiſh colour; though that on the young ſhoots

Book I. long, and bringing a good lop in a ſhort time, is by ſome preferred to Willows.

For the ſetting of theſe Mr. Cook adviſes the boring of the ground with a ſort of auger, to prevent the ſtripping of the bark from the ſtake in planting. A foot and half deep, or more if great, (for ſome may be eight or nine feet) for Pollards, cut ſloping, and free of cracks at either end. Two or three inches diameter is a competent bigneſs, and the earth ſhould be rammed cloſe to them.

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is of a fine green. The young ſhoots are cornered, having five angles; and the bark of which theſe are compoſed, being extended by the future growth, leaves only the traces of theſe angles on the older branches; and this again gives the tree in winter a particular look; for at the baſe of each bud they curve over and meet. Thus there will be between every bud formed by the bark, figures like niches, as it were, of public buildings, though with an upright in the middle, at the top of each of which, like an ornament, is ſeated the bud, for the future ſhoot or leaf. Theſe buds are only to be found on the younger branches; but the figure is retained on the bark of the older without thoſe ornaments. But of all the trees in a collection, no one more agreeably entertain us by its leaves than this, whether we conſider the colour, figure, or ſize. The colour is a light ſhining green, which is heightened in the autumn, by the ſtrong mid-rib, and the large veins that iſſue from it, turning to a red; the leſſer veins alſo being in ſome degree affected, occaſion upon the ſame leaf a ſweet contraſt. Their figure nearly reſembles that of an heart, and they are notched at the edges. But the chief majeſty this tree receives is from the ſize of the leaves: I have meaſured ſome of the younger trees, and found the leaves ten inches long and eight broad, with a ſtrong foot-ſtalk of four inches in length. Theſe majeſtic leaves are placed alternately on the branches; though, as the tree advances in height, they diminiſh in ſize. This ſpecies ſhoots late in the autumn; and theſe young ſhoots have their ends often killed in hard winters; which is an imperfection, as it cauſes the tree to have a very bad look in the ſpring, both before and when the leaves are putting out: However, theſe laſt will not fail afterwards to make ample amends for the former defect. The flowers afford no pleaſure to the Gardener; they are catkins, like other Poplars, and fit only for the inſpection of the curious Botaniſt.

5. POPULUS *(Heterophylla)* foliis cordatis primoribus villoſis. Lin. Sp. Pl. 1464. *The Virginia Poplar.*

This ſpecies of Poplar alſo forms a large timber-tree. The branches are numerous, veined, and angular. The leaves are heart-ſhaped, broad, ſlightly ſerrated, and downy on their firſt appearance. The flowers come out in looſe catkins, and

Another expedient is by making drains in very moiſt ground, two ſpade deep, and three feet wide, caſting up the earth between the drains, ſowing it the firſt year with oats to mellow the ground; the next winter ſetting it for copſe, with theſe, any, or all the watery ſorts of trees: Thus, in four or five years, you will have a handſome fell; and ſo ſucceſſively. It is in the former author, where the charge is exactly calculated, to whom I refer the reader. I am informed that in Cheſhire there grow many ſtately and ſtraight Black Poplars, which they call *Peplurus*, that yield boards and planks of an inch and half thickneſs; ſo fit for flooring of rooms, as by ſome preferred to Oak, for the whiteneſs and laſting, where they lie dry.

3. They have a Poplar in Virginia of a very peculiar ſhaped leaf, as if the point of it were cut off, which grows very well with the curious amongſt

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make little ſhow; they appear early in the ſpring, and are ſucceeded by numerous downy ſeeds, which are diſperſed all about to a conſiderable diſtance.

The Lombardy Poplar is another ſpecies of this tree; but we have none of them in this Kingdom of ſufficient age to enable us to fix the ſtandard of its excellence. So far as we yet know, it promiſes to anſwer the high character given of its quick growth.

The Poplar was ſacred to Hercules. "Populus Alcidæ gratiſſima;" and when any ceremonies were inſtituted in honour of that God, its tender branches and leaves were twined round the heads of the Votaries:

Tum Salii ad cantus, incenſa altaria circum,
Populeis adſunt evincti tempora ramis. Æn. viii.—285.

It was cuſtomary with lovers to write verſes upon the bark of different trees.—— Ovid, in the epiſtle from Oenone to Paris, fixes upon the Poplar:

Populus eſt, memini, fluviali conſita ripa,
Eſt in qua noſtri litera ſcripta memor.
Populo, vive, precor, quæ conſita margine ripæ
Hoc in rugoſo cortice carmen habes:
Cum Paris Oenone poterit ſpirare relicta
Ad fontem Xanthi verſa recurret aqua.

Homer beautifully compares the fall of Simoïſius, by the hand of Ajax, to a Poplar juſt cut down.

So falls a Poplar, that in wat'ry ground
Rais'd high the head, with ſtately branches crown'd,
(Fell'd by ſome artiſt with his ſhining ſteel,
To ſhape the circle of the bending wheel)
Cut down it lies, tall, ſmooth, and largely ſpread,
With all its beauteous honours on its head. POPE.

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us to a conſiderable ſtature. I conceive it was firſt brought over by John Tradeſcant, under the name of the Tulip-tree, (from the likeneſs of its flower) but is not, that I find, taken much notice of in any of our herbals. I wiſh we had more of them, but they are difficult to elevate at firſt *.

4. The Aſpen only (which is that kind of Lybica, or White Poplar, bearing a ſmaller and more tremulous leaf, by the French called La Tremble, or Quaker) thruſts down a more ſearching foot, and in this likewiſe differs, that he takes it ill to have his head cut off. Pliny would have ſhort truncheons couched two feet in the ground, but firſt two days dried, at one foot and a half diſtance, and then moulded over.

5. There is ſomething a finer ſort of White Poplar, which the Dutch call Abele, and we have of late much of it tranſported out of Holland. Theſe are alſo beſt propagated of ſlips from the roots, the leaſt of which

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* This tree is called by Linnæus *Liriodendron* (Tullpifera) *foliis lobatis.* Herman calls it *Tulipifera arbor Virginiana*; and Plukenet and Cateſby, *Tulipifera Virginiana, tripartito aceris folio; media lacinia velut abſciſſa*; alſo *Tulipifera Caroliniana, foliis productioribus magis anguloſis.* It is of the claſs and order *Polyandria Polygynia.*

The Tulip-tree is a native of North-America: It is a tree of the firſt magnitude, and is generally known through all the Engliſh ſettlements by the title of Poplar. Of late years there have been great numbers of theſe trees raiſed from ſeeds in the Engliſh gardens, ſo that now they are become common in the nurſeries about London; and there are many of them in ſeveral parts of England which do annually produce flowers. The firſt tree of this kind which flowered here, was in the gardens of the late Earl of Peterborough, at Parſons Green near Fulham, which was planted in a wilderneſs among other trees: Before this was planted in the open air, the few plants which were then in the Engliſh gardens, were planted in pots and houſed in winter, ſuppoſing they were too tender to live in the open air; but this tree, ſoon after it was placed in the full ground, convinced the gardeners of their miſtake, by the great progreſs it made, while thoſe which were kept in pots and tubs increaſed ſlowly in their growth; ſo that afterwards there were many others planted in the full ground, which are now arrived to a large ſize, eſpecially thoſe which were planted in a moiſt ſoil. One of the handſomeſt trees of this kind, near London, is in the garden of Waltham Abbey; and at Wilton, the ſeat of the Earl of Pembroke, there are ſome trees of great bulk; but the old tree at Parſons Green is quite deſtroyed by the other trees which were ſuffered to over-hang it, and rob it of its nouriſhment, from the fear of taking them down, leſt, by admitting the cold air, the Tulip-tree might be injured.——The young ſhoots of this tree are covered

will take, and may in March, at three or four years growth, be tranſ- CH. XV.
planted.

6. In Flanders (not in France, as a late author pretends) they have large nurſeries of them, which firſt they plant at one foot diſtance, the mould light and moiſt, by no means clayey, in which though they may ſhoot up tall, yet for want of root they never ſpread; for, as I ſaid, they muſt be interred pretty deep, not above three inches above ground, and kept clean by pruning them to the middle ſhoot for the firſt two years, and ſo till the third or fourth. When you tranſplant, place them at eight, ten, or twelve feet interval. They will likewiſe grow of layers, and even of cuttings in very moiſt places. In three years they will come to an incredible altitude; in twelve be as big as your middle; and in eighteen or twenty arrive to full perfection. A ſpecimen of this advance we have had of an Abele tree at Sion, which being lopped in February 1651, did, by the end of October 1652, produce branches as big as a man's wriſt, and ſeventeen

NOTES.

with a ſmooth purpliſh bark; they are garniſhed with large leaves, whoſe foot-ſtalks are four inches long; they are ranged alternate; the leaves are of a ſingular form, being divided into three lobes; the middle lobe is blunt and hollowed at the point, appearing as if it had been cut with ſciſſars. The two ſide-lobes are rounded, and end in blunt points. The leaves are from four to five inches broad near their baſe, and about four inches long from the foot-ſtalk to the point, having a ſtrong mid-rib, which is formed by the prolongation of the foot-ſtalk. From the mid-rib run many tranſverſe veins to the borders, which ramify into ſeveral ſmaller. The upper ſurface of the leaves is ſmooth, and of a lucid green, the under is of a pale green. The flowers are produced at the end of the branches; they are compoſed of ſix petals, three without, and three within, which form a ſort of bell-ſhaped flower, from whence the inhabitants of North-America give it the title of Tulip. Theſe petals are marked with green, yellow, and red ſpots, ſo make a fine appearance when the trees are well charged with flowers. The time of this tree's flowering is in July, and when the flowers drop, the germen ſwells and forms a kind of cone, but theſe ſeldom ripen in England.——Mr. Cateſby, in his Natural Hiſtory of Carolina, ſays, "There are ſome of theſe trees in America which are thirty feet in circumference; the boughs are unequal and irregular, making ſeveral bends or elbows, which render the trees diſtinguiſhable at a great diſtance, even when they have no leaves upon them. They are found in moſt parts of the northern continent of America, from the Cape of Florida to New-England, where the timber is of great uſe, the trunk being frequently hollowed, and made into boats big enough to carry a number of men."

BOOK I.

feet in length; for which celerity we may recommend them to ſuch late builders as ſeat their houſes in naked and unſheltered places, and that would put a guiſe of antiquity upon any new incloſure; ſince by theſe, whilſt a man is on a voyage of no long continuance, his houſe and lands may be ſo covered as to be hardly known at his return. But as they thus increaſe in bulk, their value, as the Italian Poplar has taught us, advances likewiſe; which, after the firſt ſeven years, is annually worth twelve pence more: So as the Dutch look upon a plantation of theſe trees as an ample portion for a daughter, and none of the leaſt effects of their good huſbandry; which truly may very well be allowed, if that calculation hold, which the late worthy Knight * has aſſerted, who began his plantation not long ſince about Richmond, that thirty pounds being laid out in theſe plants, would render at leaſt ten thouſand pounds in eighteen years; every tree affording thirty plants, and every of them thirty more, after each ſeven years improving twelve pence in growth till they arrive to their *acme*.

* Sir Richard Weſton.

7. The Black Poplar grows rarely with us; it is a ſtronger and taller tree than the White, the leaves more dark, and not ſo ample. Divers ſtately ones of theſe, I remember about the banks of the Po in Italy; which flouriſhing near the old Eridanus (ſo celebrated by the Poets) in which the temerarious Phaeton is ſaid to have been precipitated, doubtleſs gave argument to that fiction of the metamorphoſis of his ſad ſiſters, and the amber of their precious tears *. It was whilſt I was paſſing down that river

NOTES.

* It does not appear from Ovid that the Siſters of Phaeton were changed into *Poplars*. The ſuppoſition probably aroſe from obſerving the banks of the Eridanus, or Po, covered with theſe trees.——Others again ſay that they were changed into Larches, and this ſuppoſition ſeems as probable as the other; for Vitruvius remarks, "Larix vero, non eſt notus niſi his municipibus, qui circa ripam fluminis Padi et littora maris Adriatici." In a medal of *Publius Accoleius Lariſcolus*, the three Siſters (Heliades) are repreſented as transformed into Larches, and Montfaucon quotes Palladius as ſaying, "Reſina illa liquida eſt, lacrymæ ſimilis; non recipit flammam, quaſi odio perſequatur, ob combuſtum Phaëthontidem." This ſentence, however, is not to be found in Palladius. He only ſays, ſpeaking of Larches, "Neque enim flammam recipiunt, aut carbones creare poſſunt." Lib. xii. tit. xv. It would ſeem that Ovid himſelf meant the Larch-tree, from his deſcription of the tears of the ſorrowful Siſters.

Inde fluunt lacrymæ: ſtillataque ſole rigeſcunt
De ramis electra novis: quæ lucidus amnis
Excipit, et nuribus mittit geſtanda Latinis. MET. lib. ii.

towards Ferrara, that I diverted myſelf with this ſtory of the ingenious Poet. I am told there is a Mountain Poplar much propagated in Germany about Vienna, and in Bohemia, of which ſome trees have yielded planks of a yard in breadth: Why do we procure none of them? CH. XV.

8. The beſt uſe of the Poplar and Abele (which are all of them hoſpitable trees, for any thing thrives under their ſhade) is for walks and avenues about grounds which are ſituated low, and near the water, till coming to be very old, they are apt to grow knurry, and out of proportion. The timber is incomparable for all ſorts of white wooden veſſels, as trays, bowls, and other turner's ware; and of eſpecial uſe for the bellows-maker, becauſe it is almoſt of the nature of cork, and for ſhip-pumps, though not very ſolid, yet very cloſe, and yet light, ſo as it may be uſed for the ſoles, as well as wooden heels, of ſhoes. *Vitruvius l. de materie cædenda*, reckons it among the building-timbers, *quæ maximè in ædificiis ſunt idoneæ*. It is proper for carts, becauſe it is exceeding light; alſo for Vine and Hop-props, and divers vimineous works. The loppings in January are for the fire; and therefore ſuch as have proper grounds may, with eaſe, and in a ſhort time, ſtore themſelves for a conſiderable family, where fuel is dear: But the truth is, it burns untowardly, and rather moulders away than maintains any ſolid heat. Of the twigs, with the leaves on, are made brooms. The brya, or catkins, attract the bees; as do alſo the leaves, eſpecially of the black, being more tenacious of the meldews than moſt foreſt-trees, the Oak excepted.

Of the Aſpen, our woodmen make hoops, fire-wood, coals, &c. and the bark of young trees, in ſome countries, ſerves for candle or torch-wood.

The juice of Poplar leaves, dropped into the ears, aſſuages the pain; and the buds contuſed, and mixed with honey, is a good collyrium for the eyes, as the unguent to refrigerate and cauſe ſleep.

One thing more is not to be paſſed over, of the White Poplar; that the ſeeds of Miſleto being put into holes bored in the bark of this tree, have produced the plant.——An experiment ſufficient to determine that ſo long controverted queſtion concerning ſpontaneous and equivocal generation. Vide D. Raii H. P. Append. p. 1918.

CHAP. XVI.

The QUICK-BEAM *.

BOOK I. 1. THE QUICK-BEAM, Ornus, or, as the Pinax more peculiarly terms it, Fraxinus Bubula, others the Wild Sorb and Witchen, is a ſpecies of Wild Aſh. The berries which it produces in October may then be ſown, or rather the ſets planted. I have ſtore of them in a warm grove of mine, and it is of ſingular beauty. It riſes to a reaſonable ſtature, ſhoots upright and ſlender, and conſiſts of a fine ſmooth bark. It delights to be both in mountains and woods, and to fix itſelf in good light grounds. Virgil affirms it will unite with the Pear.

2. Beſides the uſe of it for the huſbandman's tools, goads, &c. the wheel-wright commends it for being all heart; if the tree be large, and ſo well grown as ſome there are, it will ſaw into planks, boards, and timber; our fletchers commend it for bows next to Yew, which we ought

NOTES.

* This is the SORBUS (*Aucuparia*) foliis pinnatis, utrinque glabris. Hall. Helv. 250. *Service-tree with winged leaves which are ſmooth on both ſides.* Sorbus ſylveſtris, foliis domeſticæ ſimilis. C. B. P. 415. *Wild Service with leaves like the cultivated*, commonly called *Quicken*, *Quick-beam*, *Mountain Aſh*, and in the north, *Roan-tree*.

The Quick-beam grows naturally in many parts of England; but in the ſouthern counties it is ſeldom ſeen of any great magnitude, being commonly cut down, and reduced to underwood; but in the North of England and Wales, where the trees are permitted to grow, they arrive at a conſiderable ſize. The ſtems are covered with a ſmooth gray bark, the branches while young have a purpliſh brown bark, and the leaves are winged; they are compoſed of eight or nine pair of long narrow lobes, terminated by an odd one; the lobes are about two inches long, and half an inch broad toward their baſe, ending in acute points, and are ſharply ſawed on their edges; the leaves on the young trees in the ſpring are hoary on their under ſide, which about Midſummer goes off, and thoſe upon the older branches have very little at any ſeaſon. The flowers are produced in large bunches almoſt in form of umbels, at the end of the branches; they are compoſed of five ſpreading concave petals ſhaped like thoſe of the Pear-tree, but ſmaller; theſe are ſucceeded by roundiſh berries, growing in large bunches, which have a depreſſed navel on the top, and turn red in autumn when they ripen.

The buds of this tree begin to open about the beginning of April. The leaves are out by the middle of the month, and the flowers are in full blow by the ſixth of



The Quicken Tree.

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J. Miller del. et sc.

not to paſs over, for the glory of our once Engliſh anceſtors: In a ſtatute of Henry VIII. you have it mentioned. It is excellent fuel; but I have not yet obſerved any other uſe, ſave that the bloſſoms are of an agreeable ſcent, and the berries ſuch a tempting bait for the Thruſhes, that as long as they laſt, you ſhall be ſure of their company. Some highly commend the juice of the berries, which, fermenting of itſelf, if well preſerved, makes an excellent drink againſt the ſpleen and ſcurvy: Ale and beer brewed with theſe berries, being ripe, is an incomparable drink, familiar in Wales, where this tree is reputed ſo ſacred, that there is not a church-yard without one of them planted in it (as among us the Yew); ſo, on a certain day in the year, every body religiouſly wears a croſs made of the wood; and the tree is by ſome authors called Fraxinus Cambro-Britannica, reputed to be a preſervative againſt faſcinations and evil ſpirits; whence, perhaps, we call it Witchen, the boughs being ſtuck about the houſe, or the wood uſed for walking-ſtaves.

NOTES.

May. There are three ſtyles and twenty ſtamina inſerted into the Calyx, which ſhews it to belong to the claſs and order *Icoſandria Trigynia.*

The Quick-beam is raiſed from ſeeds ſown as ſoon as ripe, in beds properly prepared. Theſe frequently remain till the ſecond ſpring before they make their appearance; and in the ſpring following they ſhould be put out into the nurſery. It is ſometimes raiſed from layers; but when cultivated in that manner, the trees are neither ſo handſome nor ſo ſtraight as thoſe raiſed from ſeeds.

This tree will grow upon almoſt any ſoil, either ſtrong or light, moiſt or dry. It will flouriſh on mountains and in woods, and is never affected by the ſeverity of weather, being extremely hardy. When loaded with fruit, it makes a moſt delightful appearance.

Sanguineiſque inculta rubent aviaria baccis. VIRG.

CHAP. XVII.

The HASEL *.

Book I.

1. NUX SILVESTRIS, or Corylus, the Haſel, is beſt raiſed from the nuts, alſo by ſuckers and layers, which you ſhall ſow like maſt, in a pretty deep furrow, toward the end of February, or treat them as you are inſtructed in the Walnut. Light ground may immediately be ſown and harrowed in very accurately; but in caſe the mould be clay, plow it earlier, and let it be ſufficiently mellowed with the froſts; and then the third year cut your trees near to the ground with a ſharp bill, the moon decreaſing.

2. But if you would make a grove for pleaſure, plant them in foſſes, at a yard diſtance, and cut them within half a foot of the earth, dreſſing them for three or four ſprings and autumns, by only looſening the mould a little about their roots. Others there are who ſet the nuts by hand at one foot diſtance, to be tranſplanted the third year, at a yard aſunder: But this work is not to be taken in hand ſo ſoon as the nuts fall, till winter

NOTES.

* There are only two ſpecies of this genus.

1. CORYLUS *(Avellana)* ſtipulis ovatis obtuſis. Hort. Cliff. 448. *Haſel Nut with oval blunt ſtipulæ.* Corylus Sylveſtris. C. B. P. 418. *Wild Haſel Nut.*

2. CORYLUS *(Colurna)* ſtipulis linearibus acutis. Hort. Cliff. 448. *Haſel Nut with narrow acute ſtipulæ.* Corylus Byzantina. H. L. 191. *Byzantine Nut.*

The Corylus, in the Linnæan Syſtem, is of the claſs and order *Monoecia Polyandria.* The flowers begin to open about the twenty-fifth of January, and in a month's time are in full blow. They are ſmall and of a beautiful red colour. The catkins make their appearance about the middle of September.

The common Haſel grows wild in almoſt every part of this iſland, and ſerves very well for thickening woods. When allowed to grow, it will make poles of twenty feet, but it is uſually cut down ſooner for walking-ſticks, fiſhing-rods, withs for faggoting, &c. for which neceſſary purpoſes it is recommended as a profitable wood.

In order to raiſe a coppice of Haſels, the nuts muſt be gathered in the autumn. Theſe muſt carefully be preſerved till the month of February in a moiſt place to keep the nuts from growing dry: then, having the ground well plowed and harrowed, let them be



The Hazel Nut Tree

T. Miller del &c.

be well advanced, becauſe they are exceedingly obnoxious to the froſts; nor will they ſprout till the ſpring; beſides, vermin are great devourers of them. Preſerve them therefore moiſt, not mouldy, by laying them in their own dry leaves, or in ſand, till January.

Plantis eduræ Coryli naſcuntur —— GEORG. ii.

Haſels from ſets and ſuckers take.

3. From whence they thrive very well, the ſhoots being of the ſcantlings of ſmall wands and ſwitches, or ſomewhat bigger, and ſuch as have drawn divers hairy twigs, which are by no means to be diſbranched, no more than their roots, unleſs by a very ſparing and diſcreet hand. Thus your coryletum, or copſe of Haſels, being planted about autumn, may, as ſome practiſe it, be cut within three or four inches of the ground the ſpring following, which the new cyon will ſuddenly repair in cluſters, and tufts of fair poles of twenty, or ſometimes thirty feet long: But I rather ſhould ſpare them till two or three years after, when they ſhall have taken ſtrong hold, and may be cut cloſe to the very earth, the improſperous and feeble ones eſpecially. Thus are Filberts likewiſe to be treated, both of

NOTES.

ſown in drills drawn at one yard diſtance; into theſe drop the nuts at about ten inches diſtance, and let them be covered with two inches of earth. When the young plants appear, they muſt be kept clear from weeds in the manner formerly ordered for trees planted in rows, and they muſt remain under that careful cultivation till the weeds are no longer to be feared. Where the plants ſtand too thick, they ſhould be properly thinned, and this thinning ought to be continued till the plants are left a yard aſunder each way. A Coryletum may alſo be raiſed from plants drawn from the ſeminary, when they are a foot or two feet high. Theſe ſhould be planted where they are to remain at one yard aſunder. In twelve years they may be cut down for poles; but they will be ready for a ſecond fall much ſooner; and afterwards may be cut every ſeventh or eighth year, when the ſtools will ſend up ſtrong and vigorous ſhoots. The Byzantine Nut is diſtinguiſhed from the other ſpecies chiefly by the ſtipulæ which are very narrow and acute, whereas theſe of the common nut are oval and obtuſe. It differs alſo in the ſize of its growth, the Byzantine ſeldom growing higher than four or five feet, hence it got the name of *Dwarf-nut-tree*. In other reſpects it is like our common Nut-tree; it flowers at the ſame time, and the fruit is produced in cluſters. Mr. Miller ſuſpects this and the Barcelona Nut to be the ſame.

The Filbert, or *Corylus ſativa fructu oblongo*, is not a diſtinct ſpecies, but only a variety of the Common Nut. This can only be kept true to its kind by ſuckers, or

Book I. them improved much by tranſplanting, but chiefly by graffing, and it ſhould be tried with Filberts, and even with Almonds themſelves, for more elegant experiments.

In the mean time, I do not confound the Filbert, Pontic, or Filbord, diſtinguiſhed by its beard, among our foreſters or bald Haſel-nuts, which doubtleſs we had from abroad; and bearing the names of Avelan, Avelin, as I find in ſome antient records and deeds in my cuſtody, where my anceſtors names were written Avelan, alias Evelin, generally.

4. For the place, they above all affect cold, barren, dry, and ſandy grounds; mountains, and even rocky ſoils produce them; they proſper where quarries of freeſtone lie underneath, as at Haſulberry in Wilts, Haſelingfield in Cambridgeſhire, Haſelmeer in Surry, and other places; but more plentifully, if the ground be ſomewhat moiſt, dankiſh, and moſſy, as in the freſher bottoms and ſides of hills, hoults, and in hedge-rows. Such as are maintained for copſes, may after twelve years be felled the firſt time; the next at ſeven or eight; for by this period their roots will be completely vigorous. You may plant them from October to January, provided you keep them carefully weeded till they have taken faſt hold; and there is not among all our ſtore a more profitable wood for copſes, and therefore good huſbands ſhould ſtore them with it.

5. The uſe of the Haſel is for poles, ſpars, hoops, forks, angling-rods, fagots, cudgels, coals, and ſpringes to catch birds; and it makes one of

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layers, which laſt are obſerved to make the beſt trees. In order to form ſtools ſome plants of the beſt kinds ſhould be procured——and the twigs layered from them ſhould be taken off and planted in the nurſery, a foot aſunder, and two feet diſtant in the rows. When well rooted they may be removed into the ground where they are to remain. In ſome parts of Kent plantations of Filberts are much attended to. The trees are never permitted to riſe above five feet in height, and are regularly pruned and diſhed out like Gooſeberry-buſhes. They ſhould ſtand at the diſtance of twelve feet, and when full ſpread the diameter of the cup formed by the branches ſhould be about ſix feet. The intermediate ſpaces ſhould be cultivated with beans, turnips, and hoeing crops, for upon the conſtant ſtirring of the ground the vigour of the trees principally depends. I am well informed that two buſhels of nuts have been gathered from one tree managed in this manner. In a ſcarce year, Filberts in the huſk are worth ſixteen ſhillings per buſhel——a great encouragement for plantations of this ſpecies. Hops

the beſt coals, once uſed for gunpowder, being very fine and light, till they found Alder to be more fit: There is no wood which purifies wine ſooner than the chips of Haſel; alſo for withs and bands, upon which I remember, Pliny thinks it a pretty ſpeculation, that a wood ſhould be ſtronger to bind withal, being bruiſed and divided, than when whole and entire. The coals are uſed by painters to draw with, like thoſe of Sallow: Laſtly, for riding ſwitches, and divinatory rods for the detecting and finding out of minerals; at leaſt, if that tradition be no impoſture. By whatſoever occult virtue the forked-ſtick, ſo cut and ſkilfully held, becomes impregnated with thoſe inviſible ſteams and exhalations, as by its ſpontaneous bending from an horizontal poſture, to diſcover not only mines and ſubterraneous treaſure, and ſprings of water, but criminals guilty of murder, &c. made out ſo ſolemnly, by the atteſtation of magiſtrates, and divers other learned and credible perſons, who have critically examined matters of fact, is certainly next to a miracle, and requires a ſtrong faith. Let the curious therefore conſult that philoſophical treatiſe of Dr. Vallemont *, which will at leaſt entertain them with a world of ſurprizing things. But now after all the moſt ſignal honour it was ever employed in, and which might deſervedly exalt this humble and common plant above all the trees of the wood, is that of hurdles, eſpecially the flexible white, the red, and brittle; not for that it is generally uſed for the folding of our innocent ſheep, an emblem of the church, but for making the walls of one of the firſt Chriſtian Oratories in the world; and particularly in this iſland, that venerable and ſacred fabrick at Glaſtonbury founded by St. Joſeph of Arimathea, which is ſtoried to have been firſt compoſed but of a few ſmall Haſel-rods interwoven about certain ſtakes driven into the ground;—and walls of this kind, inſtead of laths and punchions, ſuperinduced with a coarſe mortar made of loam and ſtraw, do to this day incloſe divers humble cottages, ſheds, and out-houſes in the country; and

* Vallemont, Phiſique Occult ou Traité de la Baguet Divinitoire, &c. But concerning the exploration and ſuperſtitious original, ſee Sir Thomas Brown's Vulgar Errors, c. xxiv. ſect. xvii. and the commentators upon Hoſea iv. 12.

NOTES.

are ſometimes raiſed between the Filbert-trees, ſo that the expectations of the planter may be gratified with one, and ſometimes two crops.

It is an obſervation of great antiquity, and well confirmed, that "a good nut year makes a good wheat year."

Contemplator item, cum ſe nux plurima ſylvis
Induet in florem, et ramos curvabit olentes:
Si ſuperant fœtus, pariter frumenta ſequentur.
Magnaque cum magno veniet tritura calore.
At ſi luxuria foliorum exuberat umbra,
Nequicquam pingues palea teret area culmos. VIRG.

it is ſtrong and laſting for ſuch purpoſes, whole or cleft, and I have ſeen ample incloſures of courts and gardens ſo ſecured.

6. There is a compendious expedient for the thickening of copſes which are too tranſparent, by laying of a ſampler, or pole, of an Haſel, Aſh, Poplar, &c. of twenty or thirty feet in length, the head a little lopped, into the ground, giving it a chop near the foot to make it ſuccumb; this faſtened to the earth with a hook or two, and covered with ſome freſh mould at a competent depth, (as gardeners lay their carnations) will produce a world of ſuckers, and thicken and furniſh a copſe ſpeedily. I add no more of Filberts, a kinder and better ſort of Haſel-nut, of larger and longer ſhape and beard; the kernels alſo covered with a fine membrane, of which the red is more delicate: they both are propagated as the Haſel, and while more domeſtick, planted either aſunder or in paliſade, are ſeldom found in the copſes. They are brought among other fruit to the beſt tables for deſert, and are ſaid to fatten; but, when too much eaten, are obnoxious to the aſthmatic. In the mean time, of this I have had experience, that Haſel-nuts, but the Filbert eſpecially, being full ripe, and peeled in warm water, as they blanch Almonds, make a pudding very little, if at all, inferior to that our Ladies make of Almonds.



The Birch Tree.

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J. Miller del et sc.

CHAP. XVIII.

The BIRCH *.

CH. XVIII.

1. BETULA, the Birch, or Birc, (whence ſome derive the name of Berkſhire) in Britiſh Bedw, is doubtleſs a proper indigene of England, tho' Pliny calls it a Gauliſh tree. It is altogether produced of roots or ſuckers, (though it ſheds a kind of ſamera about the ſpring) which being planted at four or five feet interval, in ſmall twigs, will ſuddenly riſe to trees, provided they affect the ground, which cannot well be too barren or ſpungy; for it will thrive both in the dry and the wet, ſand and ſtony, marſhes and bogs; the water-galls, and uliginous parts of foreſts that hardly bear any graſs, do many times ſpontaneouſly produce it in abundance, whether the place be high or low, and nothing comes amiſs to it. Plant the ſmall twigs, or ſuckers having roots, and after the firſt year cut them within an inch of the ſurface; this will cauſe them to ſprout in ſtrong and luſty tufts, fit for copſe and ſpring woods; or, by reducing them to one ſtem, render them, in a very few years, fit for the turner. For,

2. Though Birch be of all other the worſt of timber, yet has it its various uſes; as for the huſbandman's ox-yoaks; alſo for hoops, ſmall ſcrews, paniers, brooms, wands, bavin-bands, and withs for fagots; it

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Of this genus there are five ſpecies.

1. BETULA *(Alba)* foliis ovatis acuminatis ſerratis. Hort. Cliff. 442. *Birch-tree with oval ſawed leaves ending in points. The Common Birch-tree.*

This is the common Birch, a tree of humble growth; but nevertheleſs, if permitted, will grow to a tolerable ſize. It is excellently well calculated to diverſify the ſcene, and makes a pleaſing variety among other trees, either in winter or ſummer. In the ſummer it is covered over with beautiful ſmall leaves, which are of a pleaſant green, and by every breeze of air are pleaſingly waved on their ſlender twigs. In the winter it appears conſpicuous, preſenting itſelf with its body covered over with a whitiſh bark, which has a good effect. Theſe trees, therefore, may be planted in parks, lawns, &c. to encreaſe the variety, as well as in woods or coppices, to be cut for profit.——The lopping of the Birch makes excellent fuel, as well as the beſt of brooms. The bark is of a very durable nature: the Swedes cover their houſes with it, and it laſts many years. The

BOOK I. claims a memory for arrows, bolts, ſhafts, our old Engliſh artillery; alſo for diſhes, bowls, ladles, and other domeſtic utenſils, in the good old days of more ſimplicity, yet of better and truer hoſpitality. In New-England our Northern Americans make canoes, boxes, buckets, kettles, diſhes, (which they ſew and join very curiouſly with thread made of Cedar-roots) and divers other domeſtical utenſils, as baſkets, bags, with this tree, whereof they have a blacker kind; and of a certain fungous excreſcence from the bole, after being boiled, beaten, and dried in an oven, they make excellent ſpunck or touch-wood, and balls to play withal; it is aſtringent, and being reduced to powder, is an infallible remedy in the hæmorrhoides. They make alſo not only this ſmall ware, but even ſmall craft, pinnaces, of Birch: Ribbing them with white Cedar, and covering them with large flakes of Birch-bark, they ſew them with thread of ſpruſe-

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inner fine bark was, before the invention of paper, uſed for writing; and of the ſap is made a wholeſome wine; ſalutary, it is ſaid, for ſuch as are afflicted with the ſtone and gravel.

2. BETULA *(Nana)* foliis orbiculatis crenatis. Flor. Lap. 266. *Birch-tree with round crenated leaves.* Betula pumila foliis ſubrotundis. Amman. *Dwarf Birch.*

This ſort grows naturally in the northern parts of Europe, and upon the Alps; it ſeldom riſes above two or three feet high, having ſlender branches, garniſhed with round leaves, and rarely produces either male or female flowers here. It is preſerved in ſome curious gardens for the ſake of variety, but is a plant of no uſe.

3. BETULA *(Lenta)* foliis cordatis oblongis acuminatis ſerratis. Lin. Sp. Pl. 1394. *Birch-tree with oblong, pointed, heart-ſhaped, ſawed leaves.*

This grows to a timber-tree of ſixty or more feet in height. The leaves are heart-ſhaped, oblong, ſmooth, of a thin conſiſtence, pointed and very ſharply ſerrated. The varieties of this ſpecies differ in colour, and go by the names of, 1. Duſky Canada Birch; 2. White Paper Birch; 3. Poplar-leaved Canada Birch; 4. Low-growing Canada Birch, &c. The bark of this ſpecies is very light, tough, and durable; and the inhabitants of America uſe it for canoes.

4. BETULA *(Nigra)* foliis rhombeo-ovatis acuminatis duplicato-ſerratis. Lin. Sp. Plant. 1394. *Birch-tree with rhomboid, oval, pointed leaves, which are doubly ſawed.* Betula nigra Virginiana. Pluk. Alm. 67. *Black Virginia Birch-tree.*

This being of foreign growth, is propagated for wilderneſs and ornamental plantations; but as it begins now to become pretty common, it is to be hoped it will ſoon make a figure among our foreſt-trees, it being equally hardy with our common Birch, and will arrive at a much greater magnitude.—This ſpecies will grow

roots, and pitch them, as it ſeems we did even here in Britain, as well as the Veneti, making uſe of the Willow: Whereof Lucan, CH. XVIII.

Primum cana ſalix madefacto vimine parvam
Texitur in puppim, cæſoque induta juvenco,
Vectoris patiens, tumidum ſuper emicat amnem.
Sic Venetus ſtagnante Pado, fuſoque Britannus
Navigat Oceano ———

When Sicoris to his own banks reſtor'd,
Had quit the field, of twigs and Willow-board
They build ſmall craft, cover'd with bullock's hide,
In which they reach'd the river's farther ſide:
So ſail the Veneti, if Padus flow;
The Britains ſail on their rough ocean ſo.

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to upwards of ſixty feet in height. The branches are ſpotted, and more ſparingly ſet on the trees than the common ſorts. The leaves are broader, grow on long foot-ſtalks, and add a dignity to the appearance of the tree.——There are ſeveral varieties of this ſpecies, differing in the colour, ſize of the leaves, and ſhoots; all of which have names given them by nurſerymen, who propagate the different ſorts for ſale; ſuch as, 1. The Broad-leaved Virginian Birch; 2. The Poplar-leaved Birch; 3. The Paper Birch; 4. The Brown Birch, &c.

5. BETULA *(Alnus)* Pedunculis ramoſis. Lin. Sp. Pl. 1394. In the Flor. Lapponic. it is termed ſimply, *Alnus*. Caſpar Bauhine calls it, *Alnus rotundi-folia glutinoſa viridis*; alſo, *Alnus folio incano*; and, *Alnus folio oblongo viridi*. *The Common Alder.*

Linnæus has thought proper to claſs this tree with the Birch; but as Mr. Evelyn makes a ſeparate chapter of it, I have in this place only mentioned its botanical deſcription.

In the Linnæan Syſtem the Betula belongs to the claſs and order *Monoecia Tetandria*, there being male and female flowers ſeparately on the ſame plant, the male having four ſtamina. In general, the leaves are fully diſplayed by the beginning of April. The flowers appear in blow about the twenty-ſeventh of the ſame month; and about the eleventh of September the catkins are formed.

There are two good ways of propagating this tree, either by layers or ſeeds. If from ſeeds, they ſhould be carefully gathered in the autumn, before they drop from their ſcales, which will happen ſoon after they begin to open. Theſe ſhould be ſown in the ſeminary, about a quarter of an inch deep; and, after they are come up, ſhould be carefully cleanſed from weeds for the firſt ſummer. The ſpring following

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See Philoſoph. Tranſ. vol. ix. N°. cv. p. 93.

It alſo makes good fuel. In many of the moſſes in the Weſt-Riding of Yorkſhire are often dug up Birch-trees that burn and flame like Fir and Candle-wood; and I think Pliny ſays, the Gauls extracted a ſort of bitumen out of Birch. Great and Small Coal are made by the charing of this wood, (ſee Book iii. chap. iv. of Fuel) as of the tops and loppings, Mr. Howard's new Tan. The inner white cuticle and ſilken bark (which ſtrips off of itſelf almoſt yearly) was antiently uſed for writing-tables, before the invention of paper; there is a Birch-tree in Canada, whoſe bark

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they may be planted out in the nurſery: The rows muſt be two feet and a half aſunder, and the plants a foot and a half diſtant in the rows. Here they may remain till they are of a ſufficient ſize to be planted out for good.

Whoever has not the conveniency of procuring the ſeeds, may ſoon raiſe a great quantity by layers from very few ſtools. Having planted ſome ſtools for this purpoſe, and having headed them down to the ground, let them remain two years before they are layered. By this time each branch will have a great quantity of ſide-ſhoots, which being ſplaſhed and laid in the ground, every twig will grow, and make a fine plant, fit to be planted out in the nurſery by the autumn following. Theſe plants ſhould be taken from the ſtools, and planted as the ſeedlings; and the ſtools ought to be refreſhed with the knife, by taking off the old ſplaſhed wood, and preparing them to throw out vigourous freſh ſhoots for a ſecond operation, which ſhould be repeated every two years.

After the plants are of a ſize fit to be ſet out for good, they may be planted upon almoſt any ground with ſucceſs; for the Birch, being a native of Britain, ſuits itſelf to all ſorts of ſoils. It will thrive extremely well on barren land, whether it be wet or dry, ſandy or ſtony, marſhy or boggy. It ſows itſelf, and will come up in places where hardly any other tree will grow. To what advantage, then, may many parts of this iſland be planted with this tree, particularly ſuch as have the advantage of large rivers, where the wood may be ſent off by water; for where water-carriage may be had, the broom-man will be a conſtant purchaſer.

Whenever coppices of the Birch are planted, with a deſign to be ſold to the broom-men, the plants ſhould be taken out of the nurſery, or gathered in the woods, and ſet five feet aſunder; and in eight years they will be ready to cut; when an acre, if it has ſucceeded well, will be worth about ten pounds. After this, the trees may be cut every ſix years, when the acre will be of the ſame value. If plantations of this tree are intended for hoops and ſmaller uſes of huſbandry, they will ſupport a cutting for theſe purpoſes every twelfth year, and will be worth more than twelve pounds per acre. Thus may ſuch lands as are not worth a ſhilling an acre be improved with Birch-trees; an improvement ſo much the greater, as the nature of the tree will admit of its being raiſed and planted out at a very ſmall expence. When the land is good enough to admit of the plough, a crop of corn is the beſt preparation for a Birch plantation; but where this cannot be done, the plants may be taken out of the nurſery, when they are out of the reach of weeds, and then planted; and no farther care need be taken

will ſerve to write on, and may be made into books, and of the twigs very pretty baſkets; with the outward thicker and coarſer part of the common Birch, are divers houſes in Ruſſia, Poland, and thoſe poor northern tracts, covered, inſtead of ſlates and tile: Nay, one who has lately publiſhed an

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of them than keeping out cattle, till they are fit for cutting. The beſt ſeaſon for planting out the Birch, if it be on dry ground, is autumn; but if it be in a wet ſoil, the ſpring is preferable.

So much for the cultivation of the Common Birch; let us now give directions for the propagation of the foreign kinds: Theſe may be raiſed from ſeeds and layers. We receive the ſeeds from America, where they are natives; when ſown in beds of fine mould, and covered about a quarter of an inch deep, they will generally grow.

During the time the plants are in the ſeminary, they muſt be conſtantly weeded and watered in dry weather; and when they are one or two years old, according to their ſtrength, they ſhould be planted in the nurſery, in rows, in the uſual manner. Weeding muſt always be obſerved in ſummer, and digging between the rows in winter; and when they are about a yard or four feet high, they will be of a good ſize to be planted out for the wilderneſs-quarters.

The propagation by layers, is the way to continue the varieties of the different ſorts. A ſufficient number of plants ſhould be procured for this purpoſe, and ſet on a ſpot of double-dug ground, three yards diſtant from each other. The year following, if they have made no young ſhoots, they ſhould be headed to within half a foot of the ground, to form the ſtools, which will then ſhoot vigorouſly the ſummer following; and in the autumn the young ſhoots ſhould be ſplaſhed near the ſtools, and the tender twigs layered near their ends. They will then ſtrike root, and become good plants by the autumn following; whilſt freſh twigs will have ſprung up from the ſtools, to be ready for the ſame operation. The layers, then, ſhould be taken up, and the operation performed afreſh. If the plants deſigned for ſtools have made good ſhoots the firſt year, they need not be headed down, but ſplaſhed near the ground, and all the young twigs layered. Thus may an immediate crop be raiſed this way; whilſt young ſhoots will ſpring out in great plenty below the ſplaſhed part, in order for layering the ſucceeding year. This work, therefore, may be repeated every autumn or winter; when ſome of the ſtrongeſt layers may be planted out, if they are immediately wanted; whilſt the others may be removed into the nurſery, to grow to be ſtronger plants, before they are removed to their deſtined habitations.

Cuttings alſo, if ſet in a moiſt ſhady border the beginning of October, will frequently grow: But as this is not a ſure method, and as theſe trees are ſo eaſily propagated by layers, it hardly deſerves to be put into practice.

In Sweden the budding and leafing of the Birch-tree is conſidered as a directory for ſowing barley; and as there is ſomething extremely ſublime and harmonious in the idea, I flatter myſelf an account of it will be acceptable.

Mr. Harold Barck, in his ingenious diſſertation upon the foliation of trees, publiſhed in the Amæn. Acad. vol. III. informs us, that the illuſtrious Linnæus had, in the

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account of Sweden, ſays, that the poor people grind the very bark of Birch-trees to mingle with their bread-corn. It is affirmed by Cardan, that ſome Birch-roots are ſo very extravagantly veined, as to repreſent the ſhapes and images of beaſts, birds, trees, and many other pretty reſemblances. Laſtly, of the whiteſt part of the old wood, found commonly in doating Birches, is made the grounds of our effeminate farined Gallants ſweet powder; and of the quite conſumed and rotten (ſuch as we find reduced to a kind of reddiſh earth in ſuperannuated hollow trees) is gotten the beſt mould for the raiſing of divers ſeedlings of the rareſt plants and flowers; to ſay nothing here of the Magiſterial Faſces, for which antiently

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moſt earneſt manner, exhorted his countrymen to obſerve, with all care and diligence, at what time each tree expands its buds and unfolds its leaves; imagining, and not without reaſon, that his country would, ſome time or other, reap ſome new and perhaps unexpected benefit from obſervations of this kind made in different places.

As one of the apparent advantages, he adviſes the prudent huſbandman to watch, with the greateſt care, the proper time for ſowing; becauſe this, with the divine aſſiſtance, produces plenty of proviſion, and lays the foundation of the public welfare of the ſtate, and of the private happineſs of the people. The ignorant farmer, tenacious of the ways and cuſtoms of his anceſtors, fixes his ſowing ſeaſon generally to a month, and ſometimes to a particular week, without conſidering whether the earth be in a proper ſtate to receive the ſeed; from whence it frequently happens that what the ſower ſowed with ſweat, the reaper reaps with ſorrow. The wiſe œconomiſt ſhould therefore endeavour to fix upon certain ſigns whereby to judge of the proper time for ſowing. We ſee trees open their buds and expand their leaves, from whence we conclude that ſpring approaches, and experience ſupports us in the concluſion; but no body has as yet been able to ſhew us what trees providence has intended ſhould be our kalendar, ſo that we might know on what day the countryman ought to ſow his grain. No one can deny but that the ſame power which brings forth the leaves of trees, will alſo make the grain vegetate; nor can any one aſſert that a premature ſowing will always, and in every place, accelerate a ripe harveſt. Perhaps therefore we cannot promiſe ourſelves a happy ſucceſs by any means ſo likely, as by taking our rule for ſowing from the leafing of trees. We muſt for that end obſerve in what order every tree puts forth its leaves according to its ſpecies, the heat of the atmoſphere, and the quality of the ſoil. Afterwards, by comparing together the obſervations of the ſeveral years, it will not be difficult to determine, from the foliation of the trees, if not certainly, at leaſt probably, the time when annual plants ought to be ſown. It will be neceſſary likewiſe to remark what ſowings made in different parts of the ſpring produce the beſt crops, in order that, by comparing theſe with the leafing of trees, it may appear which is the moſt proper time for ſowing.

To theſe moſt ingenious remarks, Mr. Barck has added the order of the leafing of trees in Sweden. Mr. Stillingfleet is the only perſon that has made correct obſervations

the cudgels were uſed by the Lictor, as now the gentler rods by our tyrannical Pædagogues for lighter faults.

3. I ſhould here add the uſes of the water too, had I full permiſſion to tamper with all the medicinal virtues of trees; but if the ſovereign effects of the juice of this deſpicable tree ſupply its other defects, (which make ſome judge it unworthy to be brought into the catalogue of woods to be propagated) I may perhaps, for once, be permitted to play the empiric, and to gratify our laborious woodman with a draught of his own liquor; and the rather, becauſe theſe kind of ſecrets are not yet ſufficiently cultivated; and ingenious planters ſhould by all means be encouraged to make more trials of this nature, as the Indians and other nations have done on their Palms and trees of ſeveral kinds, to their great emolument. The myſtery is no more than this: About the beginning of March, (when the buds begin to be proud and turgid and before they explain into leaves) with a chiſel and mallet, cut a ſlit almoſt as deep as the very pith, under ſome bough or branch of a well-ſpreading Birch; cut it oblique, and not long-ways, (as a good Surgeon would make his orifice in a vein) inſerting

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upon the foliation of the trees and ſhrubs of this kingdom. The following is his kalendar, which was made in Norfolk in the year 1765.

1 Honey-ſuckle Jan. 15	13 Filberd - - April 7	25 Cheſnut - April 16
2 Gooſeberry March 11	14 Sallow - - - - 7	26 Willow - - - 17
3 Currant - - - - 11	15 Alder - - - - 7	27 Oak - - - - 18
4 Elder - - - - - 11	16 Sycamore - - - 9	28 Lime - - - - 18
5 Birch - - - April 1	17 Elm - - - - 10	29 Maple - - - - 19
6 Weeping Willow - 1	18 Quince - - - 10	30 Walnut - - - 21
7 Raſpberry - - - 3	19 Marſh Elder - - 11	31 Plane - - - - 21
8 Bramble - - - - 3	20 Wych Elm - - 12	32 Black Poplar - - 21
9 Briar - - - - - 4	21 Quicken-tree - - 13	33 Beech - - - - 21
10 Plumb - - - - - 6	22 Hornbeam - - - 13	34 Acaſia Robinia - 21
11 Apricot - - - - - 6	23 Apple-tree - - 14	35 Aſh - - - - 22
12 Peach - - - - - 6	24 Abele - - - - 16	36 Carolina Poplar - 22

In different years, and in different ſoils and expoſitions, theſe trees and ſhrubs vary as to their leafing; but they are invariable as to their ſucceſſion, being bound down to it by nature herſelf. A farmer, therefore, who would uſe this ſublime idea of Linnæus, ſhould diligently mark the time of budding, leafing, and flowering of different plants. He ſhould alſo put down the days on which his reſpective grains were ſown; and, by comparing theſe two tables for a number of years, he will be enabled to form an exact kalendar for his ſpring corn. An attention to the diſcolouring and falling of the leaves of plants, will aſſiſt him in ſowing his winter grain, and teach him how to

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a ſmall ſtone or chip, to keep the lips of the wound a little open. Sir Hugh Platt (giving a general rule for the gathering of ſap and tapping of trees) would have it done within one foot of the ground, the firſt rind taken off, and then the white bark ſlit over-thwart, no farther than to the body of the tree: Moreover, that this wound be made only in that part of the bark which reſpects the ſouth, weſt, or between thoſe quarters; becauſe, ſays he, little or no ſap riſeth from the northern, nor indeed when the eaſt wind blows. In this ſlit, by the help of your knife to open it, he

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gueſs at the approach of winter. Towards the end of September, which is the beſt ſeaſon for ſowing wheat, he will find

The leaves of the Plane-tree, tawney;
——— of the Oak, yellowiſh green;
——— of the Haſel, yellow;
——— of the Sycamore, dirty brown;
——— of the Maple, pale yellow;
——— of the Aſh, fine lemon;

The leaves of the Elm, orange;
——— of the Hawthorn, tawney yellow;
——— of the Cherry, red;
——— of the Hornbeam, bright yellow;

There is a certain kind of genial warmth which the earth ſhould enjoy at the time the ſeed is ſown *. In the animal world we obſerve this in the moſt convincing manner. In brutes the ſymptoms of that period are plainly marked. The budding, leafing, and flowering of plants, ſeem to indicate the ſame happy temperature of the earth. "Vere tument terræ et genitalia ſemina poſcunt."

Appearances of this ſublime nature may be compared to the writing upon the wall, which was ſeen by many, but underſtood by few. They ſeem to conſtitute a kind of harmonious intercourſe between God and man. They are the ſilent language of the Deity.

The ingenious and indefatigable Mr. Young has endeavoured to aſcertain the time of ſowing by another method. His experiments are accurately conducted, and his concluſions from them fairly drawn; but it were to be wiſhed that he had interwoven the idea of Linnæus with his own experiments; we ſhould then have had an unerring rule to go by. The temperature of the ſeaſon, with reſpect to heat and cold, drought and wet, differs in every year. Experiments made this year cannot determine, with certainty, for the next. They may aſſiſt, but cannot be concluſive. The hints of Linnæus conſtitute an univerſal rule for the whole world, becauſe trees, ſhrubs, and herbs, bud, leaf, flower, and ſhed their leaves, in every country, according to the difference of ſeaſons.

* In the North of England, when the ſoil turns up with a mellow and crumbly appearance, and ſmoaks, the farmers ſay the earth is *brimming*. This ſtate is but of ſhort duration, and ſhews the exact time when the ſeed ſhould be ſown. This appearance will ever coincide with the budding, leafing, flowering, &c. of ſome plants that grow in the field. The huſbandman ſhould therefore, at that time, make his obſervations, in order to form his kalendar of Flora.

directs that a leaf of the tree be inſerted, firſt fitted to the dimenſions of the ſlit, from which the ſap will diſtil in manner of filtration. Take away the leaf, and the bark will cloſe again, a little earth being clapped to the ſlit. Thus the Knight, for any tree. But we have already ſhewed how the Birch is to be treated: Faſten therefore a bottle, or ſome ſuch convenient veſſel appendant; this does the effect as well as perforation or tapping: Out of this aperture will extil a limpid and clear water, retaining an obſcure ſmack both of the taſte and odor of the tree; which (as I am credibly informed) will, in the ſpace of twelve or fourteen days, preponderate, and outweigh the whole tree itſelf, body and roots; which if it be conſtant, and ſo happen likewiſe in other trees, is not only ſtupendous, but an experiment worthy the conſideration of our profoundeſt philoſophers: *An ex ſola aqua fiunt arbores?* Whether water only be the principle of vegetables, and conſequently of trees. I ſay, I am credibly informed; and therefore the late unhappy angry man* might have ſpared his animadverſion: For he that ſaid but twenty gallons run, does he know how many more might have been gotten out of larger apertures, at the inſertion of every branch and foot in the principal roots during the whole ſeaſon? But I conceive I have good authority for my aſſertion, out of the author cited in the margin †, whoſe words are theſe: *Si menſe Martio perforaveris* Betulam *exſtillabit aqua limpida, clara, & pura, obſcurum arboris ſaporem & odorem referens, quæ, ſpacio xii aut xiv dierum, præponderabit arbori cum ramis & radicibus.* His exceptions about the beginning of March are very inſignificant, ſince I undertake not punctuality of time; and his own pretended experience ſhewed him, that in hard weather it did not run till the expiration of the month, or beginning of April, and another time on the tenth of February; and uſually, he ſays, about the twenty-fourth day, &c. at ſuch uncertainty: What immane difference then is there between the twenty-fourth of February and commencement of March? Beſides, theſe anomalous bleedings, even of the ſame tree, happen early or later, according to the temper of the air and weather. In the mean time, evident it is, that we know of no tree which does more copiouſly attract, be it that ſo much celebrated ſpirit of the world, as they call it, in form of water, (as ſome) or a certain ſpecifick liquor richly impregnated with this balſamical property: That there is ſuch a magnes in this ſimple tree, as does manifeſtly draw to itſelf ſome occult and wonderful virtue, is notorious; nor is it conceivable indeed, the difference between the efficacy of that liquor which diſtils from the bole, or parts of the tree nearer to the root, (where Sir Hugh would celebrate the inciſion) and that which weeps

CH. XVII.

* Dr. Stubb.

† Aditus novus ad Occultas Sympathiæ & Antipathiæ cauſas inveniendas, &c. à Silveſtro Rattray, M. D. Glaſguenſi. 1658, p. 55.

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out from the more ſublime branches, more impregnated with this aſtral virtue, as not ſo near the root, which ſeems to attract rather a cruder and more common water, thro' fewer ſtrainers, and neither ſo pure and aerial as in thoſe refined percolations, the nature of the places where theſe trees delight to grow (for the moſt part lofty, dry, and barren) conſidered. But I refer theſe diſquiſitions to the Learned eſpecially, as mentioned by that incomparable Philoſopher, and my moſt noble friend, the Hon. Mr. Boyle, in his Second Part of the Uſefulneſs of Natural Philoſophy, Sect. i. Eſſ. iii. where he ſpeaks of the Manna del Corpo, or Trunk-manna, as well as of that liquor from the bough; alſo of the Sura, which the Cocoa-trees afford; and that Polonian ſecret of the liquor of the Walnut-tree root; with an encouragement of more frequent experiments, to educe ſaccharine ſubſtances upon theſe occaſions: But the book being publiſhed ſo long ſince this diſcourſe was firſt printed, I take only here the liberty to refer the reader to one of the beſt entertainments in the world.

But now, before we expatiate farther concerning ſaps, it is by ſome controverted, whether this exhauſtion would not be an extreme detriment to the growth, ſubſtance, and other parts of trees: As to the growth and bulk, if what I have obſerved of a Birch, which has for very many years been perforated at the uſual ſeaſon, beſides the ſcars made in the bark, it ſtill thrives, and is grown to a prodigious ſubſtance, the ſpecies conſidered. What it would effect in other trees, the Vine excepted unſeaſonably lanced, I know not: But this calls to mind a trial of 'Squire Brotherton (mentioning ſome excortications and inciſions, by what he obſerved in pruning) that moſt, if not all, of the ſap aſcends by the lignous part of trees, not the cortical, nor between the cortical and lignous; and that the increaſe of a tree's growth in thickneſs, is by the deſcent of the ſap, and not by the aſcent; ſo as if there were no deſcent, the tree would increaſe very little, if at all; for that there is a perpetual circulation of the ſap, during the whole ſummer; and whilſt it is in this courſe, and not a deſcent, at Michaelmas only, as ſome hold, but evaporated by the branches, during ſummer and autumn, and at ſpring ſupplied with rains: He alſo thinks it probable that the bodies of plants, as well as thoſe of animals, are nouriſhed and increaſed by a double pabulum or food, as water and air both impregnated, mixing and coaleſcing by a mutual converſion.

That all plants and animals ſeem to have a twofold kind of roots, one ſpreading into the earth, the other ſhooting up into the air; which, as they

receive and carry up their proper nutriments to the body of the plant and root, ſo they carry off the uſeleſs dregs and recrements, &c. But this curious note ſeeming fitter to have been placed in our chapter of pruning (upon which this learned Gentleman has given us his experience) I beg pardon for this diverticle, and return to my ſubject.

4. But whilſt the ſecond edition was under my hand, there came to me divers papers upon this ſubject, experimentally made by a worthy friend of mine, a learned and moſt induſtrious perſon, which I had here once reſolved to have publiſhed, according to the generous liberty granted me for ſo doing; but underſtanding he was ſtill in purſuit of that uſeful and curious ſecret, I changed my reſolution into an earneſt addreſs, that he would communicate it to the world himſelf, together with thoſe other excellent enquiries and obſervations, which he is adorning for the benefit of planters, and ſuch as delight themſelves in thoſe innocent ruſticities. I will only, by way of corollary, hint ſome particulars for the ſatisfaction of the curious; and eſpecially that we may in ſome ſort gratify thoſe earneſt ſuggeſtions and queries of the late moſt obliging publiſher* of the Philoſophical Tranſactions, to whoſe indefatigable pains the learned world has been infinitely engaged. In compliance therefore to his queries, Monday, October 19, 1668, N°. xl. p. 797, 801, &c. theſe generals are ſubmitted: That in ſuch trials, as my friend eſſayed, he has not yet encountered with any ſap but what is very clear and ſweet, eſpecially that of the Sycamore, which has a dulcoration as if mixed with ſugar, and that it runs one of the earlieſt: That the Maple diſtilled when quite reſcinded from the body, and even whilſt he yet held it in his hand: That the Sycamore ran at the root, which ſome days before yielded no ſap from the branches, the experiment made at the end of March: But the accurate knowledge of the nature of ſap, and its periodic motions and properties in ſeveral trees, ſhould be obſerved by ſome at entire leiſure to attend it daily, and almoſt continually, and will require more than any one perſon's induſtry can afford; for it muſt be enquired concerning every tree, its age, ſoil, ſituation, &c. the variety of its aſcending ſap depending on it; and then of its ſap aſcending in the branches and roots; deſcending in cut branches; aſcending from root, and not from branches; the ſeaſons and difference of time in which thoſe accidents happen, &c. He likewiſe thinks the beſt expedient to procure ſtore of liquor, is to cut the trees almoſt quite through all the circles, on both ſides the pith, leaving only the outmoſt circle, and

* Mr. Oldenburg.

Book I. the barks on the north or north-eaſt ſide unpierced; and this hole, the larger it is bored the more plentifully it will diſtil; which if it be under and through a large arm near the ground, it is effected with greateſt advantage, and will need neither ſtone nor chip to keep it open, nor ſpigot to direct it to the recipient. Thus it will, in a ſhort time, afford liquor ſufficient to brew with; and in ſome of theſe ſweet ſaps, one buſhel of malt will afford as good ale as four in ordinary waters, even in March itſelf; in others, as good as two buſhels; for this, preferring the Sycamore before any other: But to preſerve it in beſt condition for brewing, till you are ſtored with a ſufficient quantity, it is adviſed, that what firſt runs be inſolated and placed in the ſun, till the remainder be prepared, to prevent its growing ſour; but it may alſo be fermented alone, by ſuch as have the ſecret. To the curious theſe eſſays are recommended: That it be immediately ſtopped up in the bottles in which it is gathered, the corks well waxed and expoſed to the ſun, till, as was ſaid, a ſufficient quantity be run; then let ſo much rye-bread (toaſted very dry, but not burnt) be put into it, as will ſerve to ſet it a working; and when it begins to ferment; take it out, and bottle it immediately. If you add a few cloves, &c. to ſteep in it, it will certainly keep the year about: It is a wonder how ſpeedily it extracts the taſte and tincture of the ſpice. Mr. Boyle propoſes a ſulphureous fume to the bottles: Spirit of wine may haply not only preſerve, but advance the virtues of ſaps; and infuſions of raiſins are obvious, and without decoction beſt, which does but ſpend the more delicate parts. Note, that the ſap of the Birch will make excellent mead.

5. To theſe obſervations, that of the weight and virtue of the ſeveral juices, would be both uſeful and curious: As, whether that which proceeds from the bark, or between that and the wood, be of the ſame nature with that which is ſuppoſed to ſpring from the pores of the woody circles? And whether it riſe in like quantity, upon comparing the inciſures? All which may be tried, firſt attempting through the bark, and ſaving that apart, and then perforating into the wood, to the thickneſs of the bark, or more, with a like ſeparation of what diſtils. The period alſo of its current would be calculated; as how much proceeds from the bark in one hour; how much from the wood or body of the tree; and thus every hour, with ſtill a deeper inciſion with a good large auger, till the tree be quite perforated; then by making a ſecond hole within the firſt, fitted with a leſſer pipe, the interior heart-ſap may be drawn apart, and examined by weight, quantity, colour, diſtillation, &c. and if no difference perceptible be detected,

the preſumption will be greater, that the difference of heart and ſap in timber, is not from the ſap's plenty or penury, but the ſeaſon; and then poſſibly the very ſeaſon of ſquaring, as well as felling of timber, may be conſiderable to the preſervation of it.

6. The notice likewiſe of the ſap's riſing more plentifully and conſtantly in the ſun than ſhade, more in the day than night, more in the roots than branch, more ſouthward, and when that and the weſt wind blows, than northward, &c. may yield many uſeful obſervations: As for planting, to ſet thicker or thinner, *(ſi cætera ſint paria)* namely, the nature of the tree, ſoil, &c. and not to ſhade overmuch the roots of thoſe trees whoſe ſtems we deſire ſhould mount, &c. That in tranſplanting trees we turn the beſt and largeſt roots towards the ſouth, and conſequently the moſt ample and ſpreading part of the head correſpondent to the roots: For if there be a ſtrong root on that quarter, and but a feeble attraction in the branches, this may not always counterpoiſe the weak roots on the north-ſide, damnified by the too puiſſant attraction of our large branches: This may alſo ſuggeſt a cauſe why trees flouriſh more on the ſouth-ſide, and have their integument and coats thicker on thoſe aſpects annually, with divers other uſeful ſpeculations, if in the mean time they ſeem not rather to be puntillos over nice for a plain foreſter. Let the curious further conſult the Philoſophical Tranſactions, N°. xliii, xliv, xlvi, xlviii, lvii, lviii, lxviii, lxx, lxxi, for farther inſtances and trials upon this ſubject of ſap; alſo that excellent treatiſe of Hen. Meibomius, *De Cereviſiis Potibuſque & Ebrianinibus extra Vinum*, annexed to *Turnebus de Vino &c.* where he ſhews how, and by whom, after the firſt uſe of water and milk, were introduced the drinks made from vegetables, vines, corn, fruits, and juices tapped out of trees.

7. To ſhew our reader yet, that theſe are no novel experiments, we are to know, that a large tract of the world almoſt altogether ſubſiſts on theſe treen liquors, eſpecially that of the Date, which being grown to about ſeven or eight feet in height, they wound, as we have taught, for the ſap, which they call toddy, a very famous drink in the Eaſt-Indies. This tree increaſing every year about a foot, near the oppoſite part of the firſt inciſure, they pierce again, changing the receiver; and ſo ſtill, by oppoſite wounds and notches, they yearly draw forth the liquor, till it arrive to near thirty feet upward, and of theſe they have ample groves and plantations, which they ſet at ſeven or eight feet diſtance; but then they uſe to percolate what they extract through a ſtratum made of the rind of the

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tree, well contuſed and beaten, before which preparation it is not ſafe to drink it; and it is obſerved that ſome trees afford a much more generous wine than others of the ſame kind. In the Cocoa and Palmeto trees, they chop a bough, as we do the Betula; but in the Date, make the inciſion with a chiſel in the body very neatly, in which they ſtick a leaf of the tree, as a lingula to direct it into the appendant veſſel.

8. The liquor of the Birch is eſteemed to have all the virtues of the ſpirit of ſalt, without the danger of its acrimony; moſt powerful for the diſſolving of the ſtone in the bladder, bloody water, and ſtrangury: Helmont ſhews how to make a beer of the water; but the wine is a moſt rich cordial, curing, as I am told, conſumptions, and ſuch interior diſeaſes as accompany the ſtone in the bladder or reins. The juice decocted with honey and wine, Dr. Needham affirms he has often cured the ſcorbut with. This wine, exquiſitely made, is ſo ſtrong, that the common ſort of ſtone bottles cannot preſerve the ſpirits, ſo ſubtile they are and volatile; and yet it is gentle, and very harmleſs in operation within the body, and exceedingly ſharpens the appetite, being drunk ante paſtum: I will preſent you with a receipt, as it was ſent me by a fair Lady, which I have often, and ſtill make uſe of.

De Lithiaſi, c. viii. n. 24, 25, &c.

9. To every gallon of Birch-water put a quart of honey, well ſtirred together; then boil it almoſt an hour with a few cloves, and a little lemon peel, keeping it well ſcummed; when it is ſufficiently boiled, and become cold, add to it three or four ſpoonfuls of good ale to make it work, which it will do like new ale; and when the yeaſt begins to ſettle, bottle it up as you do other winy liquors. It will, in a competent time, become a moſt briſk and ſpirituous drink, which, beſides the former virtues, is a very powerful opener, doing wonders for cure of the phthyſic: This wine may, if you pleaſe, be made as ſucceſsfully with ſugar, inſtead of honey, one pound to each gallon of water; or you may dulcify it with raiſins, and compoſe a raiſin-wine of it. I know not whether the quantity of the ſweet ingredients might not be ſomewhat reduced, and the operation improved: But I give it as received. The author of the Vinetum Brit. boils it but a quarter or half an hour, then ſetting it a cooling, adds a very little yeaſt to ferment and purge it; and ſo barrels it with a ſmall proportion of cinnamon and mace bruiſed, about half an ounce of both to ten gallons, cloſe ſtopped, and to be bottled a month after. Care muſt be taken to ſet the bottles in a very cool place, to preſerve them from flying;

and the wine is rather for preſent drinking than of long duration, unleſs the refrigeratory be extraordinarily cold. The very ſmell of the firſt ſpringing leaves of this tree, wonderfully recreates and exhilarates the ſpirits.

10. But beſides theſe, Beech, Alder, Aſh, Sycamore, Elder, &c. ſhould be attempted for liquors: Thus Crabs, even our very Brambles, may poſſibly yield us medical and uſeful wines. The Poplar was heretofore eſteemed more phyſical than the Betula. The ſap of the Oak, juice or decoction of the inner bark, cures the faſhions, or farcy, a virulent and dangerous infirmity in horſes, and which, like cancers, are reputed incurable by any other topic than ſome actual or potential cautery. But what is more noble, a dear friend of mine aſſured me, that a country neighbour of his, at leaſt fourſcore years of age, who had lain ſick of a bloody ſtrangury, (which by cruel torments reduced him to the very article of death) was, under God, recovered to perfect and almoſt miraculous health and ſtrength, ſo as to be able to fall ſtoutly to his labour, by one ſole draught of beer, wherein was the decoction of the internal bark of the Oak-tree*; and I have ſeen a compoſition of an admirable ſudorific and diuretic for all affections of the liver, out of the like of the Elm, which might yet be drunk daily as our Coffee is, and with no leſs delight: But quacking is not my trade; I ſpeak only here as a plain huſbandman and a ſimple foreſter, out of the limits whereof I hope I have not unpardonably tranſgreſſed. Pan was a phyſician, and he, you know, was preſident of the woods. But I proceed to the Alder.

NOTES.

* This decoction is very proper in the complaint mentioned, when there is reaſon to ſuſpect the cauſe to be a diſſolved ſtate of the blood, which is often the caſe; but when the bloody urine proceeds from the irritation of a ſtone in the kidneys or bladder, this remedy will rather aggravate than mitigate the diſeaſe.

CHAP. XIX.

The ALDER *.

BOOK I. 1. ALNUS, the Alder, is of all other the moſt faithful lover of watery and boggy places, and thoſe moſt deſpiſed weeping parts, or water-galls of foreſts;——*craſsíſque paludibus Alni*; for in better and drier ground they attract the moiſture from it, and injure it. They are propagated of truncheons, and will come of ſeeds (for ſo they raiſe them in Flanders, and make wonderful profit of the plantations) like the Poplar; or of roots, which I prefer, being ſet as big as the ſmall of one's leg, and in length about two feet, whereof one ſhould be plunged in the mud. This profound fixing of aquatick trees is recommended to preſerve them ſteady, and ſafe from the concuſſions of the winds, and violence of waters, in their liquid and ſlippery foundations. They may be placed at four or five feet diſtance, and when they have ſtruck root, you may cut them, which will cauſe them to ſpring in clumps, and to ſhoot out into many uſeful poles. But if you plant ſmaller ſets, cut them not till they are arrived to ſome competent bigneſs,

NOTES.

* According to the ſyſtem of the celebrated Linnæus, this tree is claſſed with the Birch, under the title of *Betula (Alnus) pedunculis ramoſis*. Caſpar Bauhine calls it *Alnus folio incano*; and *Alnus folio oblongo viridi*.

The flowers of the Alder-tree are in full blow about the twenty-ſixth of March. They are male and female ſeparately on the ſame plant, and the ſtamina are four, which ſhews it to belong to the claſs and order *Monoecia Tetrandria*. The catkins are formed about the ſixteenth of September. The flowers have no beauty to recommend the tree, affording pleaſure only to the botaniſt, and curious obſerver of Nature; but the leaves are moderately large, and of a deep green: The bark alſo being ſmooth, and of a purpliſh colour, makes this tree have an agreeable effect among others, in all ſorts of plantations of the watery tribe. The leaves begin to open about the ſeventh of April.

The Alder is generally planted for coppice-wood, to be cut down every ninth or tenth year for poles. Theſe coppices are raiſed either from truncheons or young trees, the latter of which I greatly prefer. In order to obtain a quantity of trees for this purpoſe, ſome ſuckers ſhould be taken out of the meadows where the Alder-trees grow. Theſe ſhould be planted on a prepared piece of ground, and afterwards headed down for ſtools. By the ſucceeding autumn they will have ſhot out many young branches, which may be laid in the ground; and by that time twelvemonth they will have taken root, when they ſhould be removed from the ſtools, and planted in rows, to acquire a



The Alder Tree.

Published ... by Peter Hunter, ... as the Act directs

J. Miller del et sc.

and that in a proper ſeaſon, which is, for all the aquaticks and ſoft woods, not till winter be well advanced, in regard of their pithy ſubſtance: Therefore, ſuch as you ſhall have occaſion to make uſe of before that period, ought to be well grown, and felled with the earlieſt, and in the firſt quarter of the increaſing moon, that ſo the ſucceſſive ſhoot receive no prejudice. Some, before they fell, diſbark their Alders, and other trees; of which ſee book iii. chap. iii. But there is yet another way of planting Alders after the Jerſey manner, and as I received it from a moſt ingenious Gentleman of that country, which is, by taking truncheons of two or three feet long, at the beginning of winter, and to bind them in fagots, and place the ends of them in water, till towards the ſpring, by which ſeaſon they will have contracted a ſwelling ſpire, or knur, about that part, which being ſet, does (like the Gennet-moil Apple-tree) never fail of growing and ſtriking root. There is a black ſort more affected to woods, and drier grounds, and bears a black berry, not ſo frequently found; yet growing ſomewhere about Hampſtead, as the learned Dr. Tancred Robinſon obſerves.

NOTES.

ſufficient height to be above the weeds, when planted in the places where they are to remain. In one or two years they will be ſtrong enough to be planted out for good. If the coppice is to ſtand upon boggy or watery ground, they may be removed from the nurſery, and planted at three feet aſunder, the holes having been previouſly prepared to receive them. Here they may ſtand for ſix or ſeven years; when every other tree ſhould be taken away, and the reſt cut down for ſtools. The ſtools will then be ſix feet aſunder; and as each ſtool will throw out many young branches for poles, they ought not to ſtand at a nearer diſtance. Every ninth or tenth year will afford a fall of theſe trees for poles; and in performing this operation, they ſhould be taken off ſmooth and fine, ſo that the ſtool may not be damaged, or hindered from producing a freſh crop.

The other leſs eligible method, though perhaps leaſt expenſive, is performed by planting truncheons three feet long.——Two of theſe feet muſt be thruſt into the ground, having firſt widened a hole with a crow, or ſome ſuch inſtrument, to prevent the bark being rubbed off by the ſoil. Theſe ſhould be ſet at the diſtance of one yard. But, at the time of the firſt fall, the planter muſt not expect to remove every other tree: Many of the truncheons will not grow; neither have I ever ſeen a coppice, raiſed in this way, ſo luxurious and beautiful as when raiſed from regular plants.

After theſe truncheons are planted, the weeds ſhould be kept down till they are ſhot out of their reach; and after every fall, in the following winter, the ſtools ought to be looked over, and all the weak ſide-branches taken off. This will ſtrengthen

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2. There are a ſort of huſbands who take exceſſive pains in ſtubbing up their Alders, wherever they meet them in the boggy places of their grounds, with the ſame indignation as one would extirpate the moſt pernicious of weeds; and when they have finiſhed, know not how to convert their beſt lands to more profit than this (ſeeming deſpicable) plant might lead them to, were it rightly underſtood: Beſides, the ſhadow of this tree does feed and nouriſh the very graſs which grows under it; and being ſet, and well plaſhed, is an excellent defence to the banks of rivers; ſo as I wonder it is not more practiſed about the Thames, to fortify and prevent the mouldering of the walls from the violent weather they are expoſed to.

3. You may cut aquatick trees every third or fourth year, and ſome more frequently, as I ſhall ſhew you hereafter. They ſhould alſo be abated within half a foot of the principal head, to prevent the periſhing of the main ſtock, and beſides to accelerate their ſprouting. In ſetting the truncheons, it were not amiſs to prepare them a little after they are fitted to the ſize, by laying them a while in water; this is alſo practicable in Willows, &c.

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thoſe which are already the ſtrongeſt, and will enable them to ſhoot up more vigorouſly for poles.

Alders planted by the ſides of rivers, brooks, &c. may be cut every eight or ten years, which will produce good profit, as well as keep the river in its proper channel.

The Alder-tree will grow to the height of about thirty-five or forty feet, and its timber is very valuable for works intended to lie conſtantly under water, where it will harden, and laſt for ages. It is ſaid to have been uſed under the Rialto at Venice; and we are told that the moraſſes about Ravenna were piled with this timber, in order to lay the foundations for building upon.

This tree admits of ſome varieties which are ſought after for curious collections; ſuch as, 1. The Long-leaved American Alder; 2. The White Alder; 3. The Black Alder; 4. The Hoary-leaved Alder; 5. The Dwarf Alder. This laſt grows upon bogs, and is with difficulty preſerved in gardens, unleſs the ſoil be naturally moiſt and wet. The others have names aſſigned them from the different colours of the leaves and bark, except the firſt ſort, which receives its title from the length of its leaves. This beautiful variety grows to about thirty feet in height, and merits a place in the choiceſt collections. It may be propagated by layers or cuttings. The branches are ſlender, ſmooth, numerous, and of a dark-brown or purple colour. The leaves are long, and free from that clammy or glutinous matter which is peculiar to thoſe of the common Alder. They are ſmooth, oval, ſpear-ſhaped, indented, and give the tree an air of

4. Of old they made boats of the greater parts of this tree, and excepting Noah's Ark, the firſt veſſels we read of were made of this material. CH. XIX.

Tunc alnos primùm fluvii ſenſêre cavatas. GEORG. i.

When hollow Alders firſt the waters try'd.

Nec non & torrentem undam levis innatat alnus
Miſſa Pado ——— GEORG. ii.

And down the rapid Po light Alders glide.

And as then, ſo now are over-grown Alders frequently ſought after for ſuch buildings as lie continually under water, where it will harden like a very ſtone; whereas being kept in any unconſtant temper, it rots immediately, becauſe its natural humidity is of ſo near affinity with its adventitious, as Scaliger aſſigns the cauſe. Vitruvius tells us, that the moraſſes about Ravenna in Italy were piled with this timber to ſuperſtruct upon, and highly commends it. I find alſo they uſed it under that famous bridge at Venice, the Rialto, which paſſes over the Grand Canal, bearing a vaſt weight. Joſ. Bauhimus pretends, that in tract of time it turns to ſtone; which perhaps it may ſeem to be, as well as other aquaticks, where it meets with ſome lapideſcent quality in the earth and water.

5. The poles of Alder are as uſeful as thoſe of Willows; but the coals far exceed them, eſpecially for gunpowder. The wood is likewiſe uſeful for piles, pumps, hop-poles, water-pipes, troughs, ſluices, ſmall trays and trenchers, woodenheels; the bark is precious to dyers, and ſome tanners and leather-dreſſers make uſe of it; and with it and the fruit, inſtead of

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freedom in its luxuriant ſtate. I have ſeen them as late as December, which gives the tree the appearance of an evergreen.

From the experience of ages the Alder is found to reſiſt all impreſſions made upon it by water, which ſingle conſideration ought to induce us to increaſe our plantations of this tree. In Flanders, and in Holland, it is raiſed in abundance for the purpoſes of making piles for the ſupport of buildings erected in moiſt and boggy ſituations.——The Alder produces a kind of cone which contains the ſeeds; but I do not find that theſe trees are raiſed with us otherwiſe than by layers or truncheons. The method of raiſing them by ſeeds, as practiſed abroad, is greatly to be commended.

Book I. galls, they compoſe an ink. The freſh leaves alone applied to the naked ſole of the foot, infinitely refreſh the ſurbated traveller. The bark macerated in water, with a little ruſt of iron, makes a black dye, which may alſo be uſed for ink: The interior rind of the Black Alder purges all hydropic and ſerous humours; but it muſt be dried in the ſhade, and not uſed green, and the decoction ſuffered to ſettle two or three days before it be drunk.

Being beaten with vinegar, it heals the itch certainly: As to other uſes, the ſwelling bunches, which are now and then found in the old trees, afford the inlayer pieces curiouſly cambletted, and very hard; but the fagots are better for the fire than for the draining of grounds by placing them (as the guiſe is) in the trenches; which old rubbiſh of flint, ſtones, and the like groſs materials, does infinitely exceed, becauſe it is for ever, preſerves the drains hollow, and being a little moulded over, will produce good graſs, without any detriment to the ground; but this is a ſecret not yet well underſtood, and would merit an expreſs paragraph, were it here ſeaſonable.

——— *& jam nos inter opacas*
Muſa vocat Salices ———

Pl. 215.



The Willow or Osier Tribe.

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CHAP. XX.

The WITHY, SALLOW, OZIER, *and* WILLOW *.

CH. XX.

1. SALIX, the Willow. Since Cato has attributed the third place to the Salictum, preferring it even next to the very Ortyard, and (what one would wonder at) before even the Olive, Meadow, or Corn-field itſelf, I have thought good to be the more particular in my diſcourſe upon it; eſpecially, ſince ſo much of that which I ſhall publiſh concerning Willows is derived from the long experience of a moſt learned and ingenious perſon, from whom I acknowledge to have received many of theſe hints. Not to perplex the reader with the various names, Greek, Gallic, Sabin, Amerine, Vitex, &c. better diſtinguiſhed by their growth and bark, and by Latin authors all comprehended under that of Salices; our Engliſh books reckon them promiſcuouſly thus: The Common White Willow, the Black, and the Hard Black, the Roſe of Cambridge, the Black Withy, the Round-long Sallow, the Longeſt Sallow, the Crack Willow, the Round-eared ſhining Willow, the leſſer Broad-leaved Willow, Silver Sallow up-

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* There are ſeveral ſpecies of this genus which grow naturally in the northern parts of Europe, of little or no uſe, being low ſhrubs, many of them not a foot in height—ſo are never cultivated; therefore I ſhall paſs them over, and only enumerate thoſe which are planted for uſe.——The ſpecies are,

1. SALIX *(Alba)* foliis lanceolatis acuminatis ſerratis utrinque pubeſcentibus, ſerraturis infimis glanduloſis. Hort. Cliff. 473. *Willow with ſpear-ſhaped, acute-pointed, ſawed leaves, which are downy on both ſides, and glands below the ſaws.* Salix vulgaris alba, arboreſcens. C. B. P. 453. *Common White Willow.*

This is the common White Willow, which is frequently found growing on the ſides of rivers and ditches in many parts of England. It grows to a large ſize, if the branches are not lopped off; the ſhoots are covered with a ſmooth, pale, green bark; the leaves are ſpear-ſhaped, between three and four inches long, and one broad in the middle, drawing to a point at each end; they are very white on their under ſide, and their upper ſide is covered with ſhort, white, woolly hairs, tho' not ſo cloſely as the under; the catkins are ſhort and pretty thick. The wood of this ſort is very white, and poliſhes ſmooth.

2. SALIX *(Triandra)* foliis ſerratis glabris, floribus triandris. Lin. Sp. Plant. 1442. *Willow with ſmooth ſawed leaves, and flowers having three ſtamina.* Salix, folio auri-

Book I. right broad Willow, Repent broad-leaved, the Redſtone, the Leſſer Willow, the Strait Dwarf, the Yellow Dwarf, the Long-leaved Yellow Sallow, the Creeper, the Black low Willow, the Willow-bay, and the Ozier. I begin with the Withy.

Withy. 2. The Withy is a reaſonably large tree, (for ſome have been found ten feet about) and is fit to be planted on high banks, and ditch ſides within reach of water, and the weeping ſides of hills, becauſe it extends its roots deeper than either Sallows or Willows. For this reaſon you ſhould plant them at ten or twenty feet diſtance; and though they grow the ſloweſt of all the twiggy trees, yet do they recompenſe it with the larger crop, the wood being tough, and the twigs fit to bind ſtrongly; the very peelings of the branches being uſeful to bind arbor-poling, and in topiary-works, vineyards, eſpalier-fruit, and the like: And we are told of ſome that have

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culato ſplendente, flexilis. Raii Hiſt. 1420. *Willow with lucid eared leaves and flexible branches.*

This ſort grows to be a large tree; the young branches are covered with a grayiſh bark; the leaves are ſmooth, and of a lucid green, ending in acute points; they are eared at their baſe, and ſawed on their edges, and are green on both ſides; the branches grow pretty erect and are flexible. This is frequently planted in Ozier grounds for the baſket-maker. The catkins are long and narrow, and the ſcales are open and acute-pointed.

3. Salix *(Pentandra)* foliis ſerratis glabris, floſculis pentandris. Hort. Cliff. 454. *Willow with ſmooth ſawed leaves, and flowers having five ſtamina.* Salix folio laureo, ſeu lato glabro odorato. Raii Hiſt. 1420. *Willow with a Bay-leaf, or broad-leaved, ſmooth, ſweet-ſcented Willow.*

This has thick ſtrong ſhoots covered with a dark green bark; the leaves are broad, and rounded at both ends; they are very ſmooth, ſawed on their edges, and when rubbed have a grateful ſmell. It is called the Bay-leaved Willow, and ſometimes the Sweet Willow; it grows quick, and is a tree of middling ſize. The branches are brittle, which makes them improper for many purpoſes.

4. Salix *(Vitellina)* foliis ſerratis ovatis acutis glabris, ſerraturis cartilagineis, petiolis calloſo punctatis. Hort. Upſal. 295. *Willow with ſmooth, oval, acute, ſawed leaves, having cartilaginous indentures, and foot-ſtalks with callous punctures.* Salix ſativa lutea, folio crenato. C. B. P. 473. *Yellow cultivated Willow with a crenated leaf.*

This ſort has ſlender tough ſhoots, which are of a yellow colour; the leaves are oval, acute-pointed, ſmooth, and ſawed on their edges; the ſaws are cartilaginous,

been twiſted into ropes of an hundred and twenty paces, ſerving inſtead of cables. There are two principal ſorts of theſe Withies, the Hoary, and the Red Withy, which is the Greek; tougheſt, and fitteſt to bind, whilſt the twigs are flexible and tender.

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3. Sallows grow much faſter, if they are planted within reach of water, or in a very mooriſh ground, or flat plain; and where the ſoil is, by reaſon of extraordinary moiſture, unfit for arable or meadow; for in theſe caſes it is an extraordinary improvement: In a word, where Birch and Alder will thrive. Before you plant them, it is found beſt to turn the ground with a ſpade, eſpecially if you deſign them for a flat. We have three ſorts of Sallows amongſt us, (which is one more than the antients challenged, who name only the Black, and White which was their Nitellina) the Vulgar Round-leaved, which proves beſt in drier banks, and the

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and the foot-ſtalks of the leaves have callous punctures. This is very pliable, ſo is much planted in the Ozier grounds for the baſket-makers, but it never grows to a large ſize.

5. SALIX *(Amygdalina)* foliis ſerratis glabris lanceolatis petiolatis, ſtipulis trapeziformibus. Flor. Leyd. Prod. 83. *Willow with ſmooth, ſpear-ſhaped, ſawed leaves, having foot-ſtalks, and trapezium-ſhaped ſtipulæ.* Salix folio amygdalino, utrinque virente aurito. C. B. P. 43. *Almond-leaved Willow with leaves which are eared, and green on both ſides.*

This is a Willow of the middle ſize, ſending forth numerous, flexible, tough branches, covered with a light-green bark. The leaves are ſpear-ſhaped, ſmooth, ſerrated, acute, eared at their baſe, and of a light-green colour on both ſides. The flowers are oblong catkins, which turn to a light down in the ſummer.—— There are ſeveral ſorts of this ſpecies, which are of inferior value to this, which is generally diſtinguiſhed from the others by the name of the Old Almond-leaved Willow. The branches are very tough and flexible, and when planted in the Ozier way, and grown one year from the ſtools, are very ſtrong, and highly ſerviceable for the different purpoſes of baſket-making.

6. SALIX *(Fragilis)* foliis ſerratis glabris ovato-lanceolatis, petiolis dentato-glanduloſis. Flor. Lapp. 349. *Willow with oval, ſpear-ſhaped, ſmooth, ſawed leaves, and indented glandules to the foot-ſtalk.* Salix, folio longo latoque ſplendente, fragilis. Raii Syn. 3. p. 448. *The Crack Willow.*

This grows to a middling ſize; the ſhoots are covered with a browniſh bark, and very brittle, ſo are unfit for the baſket-makers. The leaves are near five inches long and one broad, are of a lucid green on both ſides, and ſawed on their edges;

BOOK I. Hopping Sallows, which require a moiſter ſoil, growing with incredible celerity; and a third kind, of a different colour from the other two, having the twigs reddiſh, the leaf not ſo long, and of a more duſky green; more brittle whilſt it is growing in twigs, and more tough when arrived to a competent ſize: All of them uſeful for the thatcher.

4. Of theſe, the Hopping Sallows are in greateſt eſteem, being of a clearer terſe grain, and requiring a more ſucculent ſoil; beſt planted a foot deep, and a foot and a half above ground, (though ſome will allow but a foot) for then every branch will prove excellent for future ſettlings. After three years growth, being cropped the ſecond and third, the firſt year's increaſe will be betwixt eight and twelve feet long generally; the third year's growth, ſtrong enough to make rakes and pike-ſtaves; and the fourth, for Mr. Blithe's trenching plow, and other like utenſils of the huſbandman.

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the catkins are long and ſlender, and the ſcales are pretty long, acute-pointed, and ſtand open. It is commonly called Crack Willow, from the branches being very brittle.

7. SALIX *(Purpurea)* foliis ſerratis glabris lanceolatis, inferioribus oppoſitis. It. Scan. 252. *Willow with ſmooth, ſpear-ſhaped, ſawed leaves, the lower of which grow oppoſite.* Salix folio longo ſubluteo non auriculata, viminibus rubris. Raii Syn. *The long-leaved Red Willow.*

This is a tree of middling ſize; the ſhoots are very pliable, and fit for the baſket-makers, which recommends it for the Ozier grounds; they are of a reddiſh colour; the leaves are ſpear-ſhaped, ſmooth, and ſawed on their edges; thoſe on the lower part of the branches are placed oppoſite, but on the upper they are alternate, and are of a yellowiſh green.

8. SALIX *(Viminalis)* foliis ſubintegerrimis lanceolato-linearibus longiſſimis acutis ſubtus ſericeis, ramis virgatis. Flor. Suec. 813. *Willow with the longeſt, linear, ſpear-ſhaped, acute leaves, which are almoſt entire, and ſilky on their under ſide, and rod-like branches.* Salix foliis anguſtis & longiſſimis criſpis, ſubtus albicantibus. J. B. 1. p. 212. *Willow with the longeſt, narrow, curled leaves, which are white on their under ſide. The Ozier.*

This is the Ozier, a tree of low growth, though the ſhoots grow amazingly long and ſtrong in one year from the ſtools. The leaves are ſpear-ſhaped, narrow, long, acute, almoſt entire, of a blueiſh green on their upper ſide and hoary underneath, and grow on very ſhort foot-ſtalks. This is the moſt propagated of all the kinds for baſket-making: It admits of ſeveral ſorts of different value, but all are

5. If ye plant them at full height (as ſome do at four years growth, ſetting them five or ſix feet length, to avoid the biting of cattle) they will be leſs uſeful for ſtraight ſtaves, and for ſettlings, and make leſs ſpeed in their growth; yet this alſo is a conſiderable improvement.

6. Theſe would require to be planted at leaſt five feet diſtance (ſome ſet them as much more) and in the quincunx order: If they affect the ſoil, the leaf will come large, half as broad as a man's hand, and of a more vivid green, always larger the firſt year than afterwards: Some plant them ſloping, and croſs-wiſe like a hedge; but this impedes their wonderful growth; and (though Pliny ſeems to commend it, teaching us how to ex-corticate ſome places of each ſet, for the ſooner production of ſhoots) it is

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uſeful to the baſket-maker.—The varieties uſually go by the names of the Green Ozier, the Old Baſket Ozier, Welſh Wicker, &c.

9. SALIX *(Rubra)* foliis integris, glabris lineari lanceolatis acutis. Hudſ. Flor. Angl. 364. *Willow with linear, ſpear-ſhaped, ſmooth leaves.* Salix minimè fragilis, foliis longiſſimis, utrinque viridibus, non ſerratis. D. Sherard. Raii Syn. 449. *The leaſt brittle Willow, with very long leaves which are green on both ſides, and not ſawed.*

This ſort having very pliant branches, is much planted in the Ozier grounds. The leaves are very long; they are ſpear-ſhaped and entire, and are green on both ſides. It grows to a middling ſize, if planted in moiſt land.

10. SALIX *(Babylonica)* foliis ſerratis glabris lineari-lanceolatis, ramis pendulis. Hort. Cliff. 454. *Willow with ſmooth, ſawed, linear, ſpear-ſhaped leaves, and hanging branches.* Salix Orientalis, flagellis deorſum pulchrè pendentibus. Tourn. Cor. 41. *The Weeping Willow.*

The Weeping Willow of Babylon will grow to be a large tree; its branches being long, ſlender, and pendulous, makes it proper to be planted upon the banks of rivers, ponds, and over ſprings; the leaves, alſo, are long and narrow; and when any miſt or dew falls, a drop of water is ſeen hanging at their extremities, which, together with their hanging branches, cauſe a moſt lugubrious appearance. Lovers garlands are ſaid to have been made of a ſpecies of this Willow, the branches of which are very ſlender and pliable; and the plant itſelf has always been ſought after for ornamental plantations, either to mix with others of the like growth in the largeſt quarters, or to be planted out ſingly over ſprings, or in large opens, for the peculiar variety occaſioned by its mournful look.

11. SALIX *(Helix)* foliis ſerratis glabris lanceolato-linearibus, ſuperioribus oppoſitis obliquis. Flor. Leyd. Prod. 83. *Willow with linear, ſpear-ſhaped, ſmooth, ſawed leaves,*

Book I. but a deceitful fence, neither fit to keep out ſwine nor ſheep; and being ſet too near, inclining to one another, they ſoon deſtroy each other.

7. The worſt Sallows may be planted ſo near, yet as to be inſtead of ſtakes in a hedge, and then their tops will ſupply their dwarfiſhneſs; and to prevent hedge-breakers, many do thus plant them, becauſe they cannot eaſily be pulled up after once they have ſtruck root.

8. If ſome be permitted to wear their tops five or ſix years, their palms will be very ample, and yield the firſt and moſt plentiful relief to bees, even before our apricots bloſſom. The Hopping Sallows open and yield their palms before other Sallows; and when they are blown (which is about

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the upper of which are placed obliquely oppoſite. Salix humilior, foliis anguſtis ſubcæruleis ex adverſo binis. Raii Syn. 2. p. 297. *The yellow Dwarf, or Roſe Willow.*

The Roſe-Willow is of much lower growth than the former. The body of the tree is covered with a rough, yellow bark. The branches are upright, tough, and of a reddiſh colour. The leaves are ſpear-ſhaped, narrow, ſmooth, of a blueiſh green colour, and, towards the upper part of the branches, are nearly oppoſite to each other. The flowers come out from the ſides of the branches, and numbers of them are joined together in a roſe-like manner. They are of a greeniſh white colour, and have a ſingular and beautiful appearance.

12. Salix *(Caprea)* foliis ovatis rugoſis, ſubtus tomentoſis, undatis ſupernè denticulatis. Flor. Leyd. Prod. 83. *Willow with oval rough leaves which are waved, woolly on their under ſide, and indented towards the top.* Salix latifolia rotunda. C. B. P. 474. *Broad round-leaved Willow, or Sallow.*

The Sallow is well known all over England, and delights in a dry rather than a moiſt ſoil. It is a tree rather below the middle growth. The branches are brittle, ſmooth, of a dark green colour, and their chief uſe is for hurdlewood and the fire; though the trunk, or old wood, is admirable for ſeveral uſes in the turnery way. The leaves are oval, rough, waved, indented at the top, and woolly underneath. The catkins are very large, white, appear early in the ſpring, and are much reſorted to by the bees, on their firſt coming out of their hives at that early ſeaſon.——There is a variety of this ſpecies with long leaves, which end in acute points; and another with ſmooth leaves, beautifully ſtriped with white, called the Striped Sallow.

The Willow belongs to the claſs and order *Dioecia Diandria*, having male and female flowers on ſeparate plants, and whoſe male flowers have two ſtamina. The flowers of that ſpecies called the Sallow make their appearance about the eleventh of March,

the exit of May, or ſometimes June) the palms (or ὀλεσικάρποι, Frugiperdæ, as Homer terms them, for their extreme levity) are four inches long, and full of a fine lanuginous cotton. Of this ſort, there is a Salix near Darking in Surry, in which the Julus bears a thick cottonous ſubſtance: A poor body might in an hour's ſpace gather a pound or two of it, which reſembling the fineſt ſilk, might doubtleſs be converted to ſome profitable uſe by an ingenious houſewife, if gathered in calm evenings, before the wind, rain, and dew impair them: I am of opinion, if it were dried with care, it might be fit for cuſhions, and pillows of chaſtity, for ſuch of old was the reputation of the ſhade of thoſe trees.

9. Of theſe Hopping Sallows, after three years rooting, each plant will yield about a ſcore of ſtaves of full eight feet in length, and ſo following, for uſe, as we noted above: Compute then how many fair pike-ſtaves,

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and the leaves are out by the ſeventh of April. The leaves of the Weeping Willow are to be ſeen about the firſt of that month; and the buds of the White Willow will be ſwelled by the tenth of April; and by the eighteenth the leaves will be quite out, and the flowers full blown. The catkins of the Sallow are formed about the fifth of October.

The Willow, Sallow, and Ozier being quick-growing trees, they naturally invite the attention of ſuch Gentlemen as have lands ſuitable to their cultivation; and indeed the immediate profit that they yield makes them a deſirable object of attention. In order to raiſe a bed of Oziers the ground ſhould be dug over, or plowed; the latter of which is not ſo beneficial as the former, though leaſt expenſive: The cuttings muſt then be procured; and although they ſhould conſiſt chiefly of the true Ozier kinds, yet other ſorts muſt be introduced into this Ozier bed, to make it complete, and more uſeful to the baſket-maker, who will want the different ſorts for the different purpoſes in his trade. Beſides the true Ozier, of which the plantation is chiefly to conſiſt, there muſt be the Sallow, the long-ſhooting Green Willow, the Crane Willow, the Golden Willow, the Silver Willow, the Welſh Wicker, &c. by which names they are beſt known.

The cuttings ſhould be of two-years wood, though the bottom parts of the ſtrongeſt one-year ſhoots may do. They ought to be two feet and a half long, a foot and a half of which ſhould be thruſt into the ground, and the other foot remain for the ſtool. Theſe cuttings ſhould be put in at two feet two inches diſtance each way; and all the ſummer following the weeds muſt be kept under; the ſummer after that alſo the talleſt of the weeds ſhould be hacked down. The Willows muſt continue growing for three years, when they ſhould be all cut down to the firſt-planted head. They will ſell well to the hurdle-makers; and there will be a regular quantity of proper ſtools left, to exhibit an annual crop of twigs which will be worth five or ſix pounds, or more, per acre, to be ſold to the baſket-makers. But the price of the twigs is greater or leſs, in pro-

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perches, and other uſeful materials, that will amount to in an acre, if planted at five feet interval; but a fat and moiſt ſoil requires indeed more ſpace than a lean or drier, namely, ſix or eight feet diſtance.

10. You may plant ſettlings of the very firſt year's growth; but the ſecond year they are better, and the third year better than the ſecond, and the fourth as good as the third, eſpecially if they approach the water. A bank, at a foot diſtance from the water, is kinder for them than a bog, or to be altogether immerſed in the water.

11. It is good to new-mould them about the roots every ſecond or third year, but men ſeldom take the pains. It ſeems that Sallows are more hardy than even Willows and Oziers, of which Columella takes as much care as of Vines themſelves. But it is cheaper to ſupply the vacuity of ſuch accidental decays by a new plantation, than to be at the charge of

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portion to the nature of the ſituation. Watery ground, by the ſides of navigable rivers, planted in this manner, will produce a greater price per acre, becauſe near ſuch places there generally reſide numbers of baſket-makers, who, having the conveniency of water-carriage, can ſend their twigs with more eaſe to diſtant places.

Plantations of theſe kinds may not only be regularly made to great advantage on watery land, by the ſides of rivers, but the very iſlands, or any part where there is mud or earth, may be planted this way, to the great profit of the proprietors, which would otherwiſe produce nothing. And here ſuffer me to give one caution in the planting of theſe places: Let the rows, which ſhould always run the ſame way with the ſtream, be at a greater diſtance from each other, and the cuttings proportionably cloſer in the rows. I adviſe the diſtance of the rows to be greater in theſe places, that the floods may have free liberty to carry off the ſludge, which would otherwiſe be detained to the prejudice of the ſets. Plantations of Willows to be cut down every ſix or ſeven years for poles, ſhould be raiſed in the ſame manner, remembering that the ſets ſhould be placed at a greater diſtance, viz. one yard; but when deſigned for hurdles, to be cut every ſecond or third year, the diſtance need not be ſo great.

In order to raiſe a Salictum, or a plantation of Willows for timber, the ground muſt be dug or plowed; and the cuttings for this purpoſe ſhould be of the laſt year's ſhoot. They ought to be a foot and a half long, and a foot of each ſhould be thruſt into the ground, at the diſtance of three feet each way. The latter end of May, or the beginning of June, the plantation ſhould be looked over; when ſuch ſets as have ſhot out too luxuriant ſhould have all the branches removed, except the ſtrongeſt leading ſhoot. All this ſummer and the next the weeds muſt be kept down; afterwards, the trees will demand no farther care till the time of thinning, which will be in about five or ſix years. When the branches interfere with each other, the weakeſt tree ſhould be

digging about them three times a year, as that author adviſes, ſeeing ſome of them will decay whatever care be uſed.

12. Sallows may alſo be propagated like Vines, by courbing and bowing them in arches, and covering ſome of their parts with mould, &c. alſo by cuttings and layers, and ſome years by the ſeeds likewiſe.

13. For ſettlings, thoſe are to be preferred which grow neareſt to the ſtock, and ſo (conſequently) thoſe worſt which moſt approach the top. They ſhould be planted in the firſt fair and pleaſant weather in February, before they begin to bud; we about London begin at the latter end of December. They may be cut in ſpring for fuel, but beſt in autumn for uſe; but in this work (as of Poplar) leave a twig or two, which being twiſted arch-wiſe, will produce plentiful ſprouts, and ſuddenly furniſh a head.

14. If in our copſes every fourth ſet were a Sallow, amongſt the reſt of varieties, the profit would recompenſe the care; therefore where in woods

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grubbed up and taken away, to make room for the remainder. In five or ſix years more they will require a ſecond thinning. In this manner they muſt be thinned as often as they touch one another, till the trees are arrived to their full maturity. By planting the cuttings a yard aſunder at firſt, and afterwards thinning of them, they not only draw each other up, and by that means aſpire to a great height, but the plants taken away to make room for the ſtrongeſt will bring in a conſiderable profit when ſold as poles.

The ſorts uſed for plantations of theſe trees have hitherto been the common white and red Willow. Theſe, however, ſeem now to give place to other kinds which have been lately introduced.

Sets proper to be planted by the ſides of ditches, &c. for pollards, ſhould be nine feet in length, two feet and a half of which muſt be thruſt into the ground, having firſt prepared the way by driving down a crow, or ſome ſuch inſtrument, to prevent the bark, though the end be ſharpened, from ſeparating from the ſtem. After they are planted, they ſhould be thorned from cattle; and in five or ſix years they will be fit for lopping; and thus may be continued to be lopped every fifth or ſixth year, to the improvement of ditch-ſides, water-gutters, &c. were it only for the fuel, as it emits little ſmoke, is remarkably ſweet, burns pure and clear to the laſt, and is therefore proper for Ladies chambers, and ſuch people as are curious in procuring the ſweeteſt ſorts of fire-wood.

Willows may be planted in the autumn, but the ſpring is the ſureſt ſeaſon. The planting however ſhould not be delayed later than February, as the ſhoots of the ſucceeding year would not only be retarded, but the ſtools from whence they were taken greatly injured.

Book I. you grub up trees, thruſt in truncheons of Sallows, or ſome aquatick kind In a word, an acre or two furniſhed with this tree, would prove of great benefit to the planter.

15. The ſwift-growing Sallow is not ſo tough and hardy for ſome uſes as the ſlower, which makes ſtocks for gardeners' ſpades; but the other is proper for rakes, pikes, mops, &c. Sallow-coal is the ſooneſt conſumed, but of all others the moſt eaſy and accommodate for painters ſcriblets to deſign their work and firſt ſketches on paper with, &c. as being fine, and apt to ſlit into pencils. Of the Sallow (as of the Lime-tree) is made the ſhoemaker's carving or cutting board, as beſt to preſerve the edge of their knives, for its equal ſoftneſs every way.

Ozier. 16. Oziers, or the aquatick and leſſer Salix, are of innumerable kinds, commonly diſtinguiſhed from Sallows, as Sailows are from Withies, being ſo much ſmaller than the Sailows, and ſhorter lived, and requiring more conſtant moiſture, yet ſhould be planted in rather a dryiſh ground, than over moiſt and ſpewing, which we frequently cut trenches to avert. It likewiſe yields more limber and flexible twigs for baſkets, fiaſkets, hampers, cages, lattices, cradles, &c. It is of excellent uſe for the bodies of coaches and waggons, being light, durable, and neat, as it may be wrought and covered. It is good for chairs, hurdles, ſtays, bands, the ſtronger for being contuſed and wreathed; likewiſe for fiſh-weirs, and to ſupport the banks of impetuous rivers: In fine, for all wicker and twiggy works;

Viminibus Salices ——— Virg.

17. But theſe ſort of Oziers ſhould be cut in the new ſhoot; for if they ſtand longer they become more inflexible: Cut them cloſe to the head, a foot or ſo above earth, about the beginning of October, unleſs you will attend till the cold be paſt, which is better; and yet we about London cut them in the moſt piercing ſeaſons, and plant them alſo till Candlemas, which thoſe who do not obſerve, we judge ill huſbands, as I learn from a very experienced baſket-maker; and in the decreaſe, for the benefit of the workman, though not altogether for that of the ſtock, and ſucceeding ſhoot. When they are cut, make them up into bundles, and give them ſhelter; but ſuch as are for white-work, as they call it, being thus fagotted and made up in bolts, as the term is, ſevering each ſort by themſelves, ſhould be ſet in water, the ends dipped; and indeed all peeled wares of the viminious kind are not otherwiſe preſerved from the worm; but for black

and unpeeled, ſhelter them under covert only, or in ſome vault or cellar, to keep them freſh, ſprinkling them now and then in exceſſive hot weather: The peelings of the former are for the uſe of the gardener and cooper, or rather the ſplicings.

18. We have in England theſe three vulgar ſorts; one of little worth, being brittle, and very much reſembling the fore-mentioned Sallow, with reddiſh twigs, and more greeniſh and rounder leaves: Another kind there is, called Perch, of limber and green twigs, having a very ſlender leaf: The third ſort is totally like the ſecond, only the twigs are not altogether ſo green, but yellowiſh, and near the Popinjay: This is the very beſt for uſe, being tough and hardy. But the moſt uſual names by which baſket-makers call them about London, and which are all of different ſpecies, therefore to be planted ſeparately, are, the Hard Gelſter, the Horſe Gelſter, Whining or Shrivelled Geiſter, the Black Gelſter, with which Suffolk abounds. Then follow the Golſtones, the Hard and the Soft Golſtone (brittle and worſt of all the Golſtones) the Sharp and Slender topped Yellow Golſtone; the Fine Golſtone: Then is there the Yellow Ozier, the Green Ozier, the Snake, or Speckled Ozier, Swallow-tail, and the Spaniard: To theſe we may add (amongſt the number of Oziers, for they are both governed and uſed alike) the Flanders Willow, which will arrive to be a large tree, as big as one's middle, the oftener cut the better; with theſe our coopers tie their hoops to keep them bent. Laſtly, the White Sallow, which being of a year or two growth, is uſed for Green-work; and if of the tougheſt ſort, to make quarter-can hoops, of which our ſeamen provide great quantities.

19. Theſe choicer ſorts of Oziers, which are ever the ſmalleſt, alſo the Golden Yellow and White, which is preferred for propagation and to breed of, ſhould be planted of ſlips of two or three years growth, a foot deep, and half a yard in length, in mooriſh grounds or banks, or elſe in furrows; ſo that, as ſome direct, the roots may frequently reach the water, *Fluminibus Salices*——though we commonly find it rots them, and therefore never chuſe to ſet them ſo deep as to ſcent it.

20. The ſeaſon for planting is January, and all February, tho' ſome not till Mid-February, at two feet ſquare; but cattle being exceſſively liquoriſh of their leaves and tender buds, ſome talk of graffing them out of reach upon Sallows, and by this to advance their ſprouting; but as the work would conſume time, ſo have I never ſeen it ſucceed.

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21. Some do alſo plant Oziers, in their *Eights*, like Quick-ſets, thick, and (near the water) keep them not more than half a foot above ground; but then they muſt be diligently cleanſed from moſs, ſlab, and ouze, and frequently pruned, eſpecially the ſmaller ſpires, to form ſingle ſhoots, at leaſt that few or none grow double; theſe they head every ſecond year about September, the autumnal cuttings being beſt for uſe: But generally,

22. You may cut Withies, Sallows, and Willows at any mild and gentle ſeaſon, between leaf and leaf, even in winter; but the moſt congruous time both to plant and to cut them is, *Creſcente lunâ Vere, circa Calendas Martias*; that is, about the new moon, and firſt open weather of the early ſpring.

23. It is in France, upon the Loire, where theſe *Eights*, as we term them, and plantations of Oziers and Withies, are perfectly underſtood; and both there, and in divers other countries beyond ſeas, they raiſe them of ſeeds contained in their Juli, or Catkins, which they ſow in furrows, or ſhallow trenches, and it ſprings up like corn in the blade, and comes to be ſo tender and delicate, that they frequently mow them with a ſcythe: This we have attempted in England too, even in the place where I live; but the obſtinate and unmerciful weeds did ſo confound them, that it was impoſſible to keep them clean with any ordinary induſtry, and ſo they were given over: It ſeems, either weeds grow not ſo faſt in other countries, or that the people, which I rather think, are more patient and laborious.

Note, That theſe Juli are not all of them ſeed-bearers; ſome are ſterile, and whatever you raiſe of them will never come to bear; and therefore by ſome they are called the male ſort, as Mr. Ray, that learned botaniſt, has obſerved. The Ozier is of that emolument, that in ſome places I have heard twenty pounds has been given for one acre; ten is in this part an uſual price; and doubtleſs it is far preferable to the beſt corn-land, not only for that it needs but once planting, but becauſe it yields a conſtant crop and revenue to the world's end; and is therefore, in eſteem of knowing perſons, valued in purchaſe accordingly; conſidered likewiſe how eaſily it is renewed, when a plant now and then fails, by but pricking in a twig of the next at hand, when you viſit to cut them. We have in the pariſh near Greenwich, where I lately dwelt, improved land from leſs than one pound to near ten pounds the acre: And when we ſhall reflect upon the infinite quantities of them we yearly bring out of France and Flanders, to ſupply

the extraordinary expence of baſket-work, &c. for the Fruiterers, Lime-burners, Gardeners, Coopers, Packers-up of all ſorts of ware, and for general carriage, which ſeldom laſt above a journey or two, I greatly admire Gentlemen do not more think of employing their moiſt grounds (eſpecially where tides near freſh rivers are reciprocal) in planting and propagating Oziers. To omit nothing of the culture of this uſeful Ozier, Pliny would have the place to be prepared by trenching it a foot and a half deep, and in that to fix the ſets, or cuttings, of the ſame length at ſix feet interval. Theſe, if the ſets be large, will come immediately to be trees; which after the firſt three years are to be abated within two feet of the ground; then in April he adviſes to dig about them. Some raiſe them abundantly, by laying poles of them in a boggy earth only: Of theſe they formerly made Vine-props, Juga, as Pliny calls them, for arch-wiſe bending and yoaking, as it were, the branches to one another; and one acre hath been known to yield props ſufficient to ſerve a Vineyard of twenty-five acres.

24. John Tradeſcant brought a ſmall Ozier from St. Omers in Flanders, which makes incomparable net-works, not much inferior to the Indian twig, or bent-works, which we have ſeen; but if we had them in greater abundance, we ſhould haply want the artificers who could employ them, and the dexterity to varniſh ſo neatly.

WILLOW.

25. Our common Salix, or Willow, is of two kinds, the White and the Black: The White is alſo of two ſorts, the one of a yellowiſh, the other of a browner bark: The Black Willow is planted of ſtakes, of three years growth, taken from the head of an old tree, before it begins to ſprout; ſet them of ſix feet high, and ten diſtant, as directed for the Poplar. Thoſe woody ſorts of Willow delight in meads and ditch-ſides, rather dry than over wet (for they love not to wet their feet, and laſt the longer); yet the black ſort, and the reddiſh, do ſometimes well in more boggy grounds, and ſhould be planted of ſtakes as big as one's leg, cut as the other at the length of five or ſix feet, or more into the earth; the hole made with an oaken ſtake and beetle, or with an iron crow, (ſome uſe a long auger) ſo as not to be forced in with too great violence: But firſt the truncheons ſhould be a little ſloped at both extremes, and the biggeſt planted downwards: To this, if they are ſoaked in water two or three days (after they have been ſized for length, and the twigs cut off before you plant them) it will be the better. Let this be done in February, the mould as

Book I. well cloſed to them as poſſible, and treated as was taught in the Poplar. If you plant for a kind of wood, or copſe, for ſuch I have ſeen, ſet them at ſix feet diſtance, or nearer, in the quincunx, and be careful to take away all ſuckers from them at three years end; you may abate the head half a foot from the trunk, viz. three or four of the luſtieſt ſhoots, and the reſt cut cloſe, and bare them yearly, that the three, four, or more you left may enjoy all the ſap, and ſo thoſe which were ſpared will be gallant pearches within two years. Arms of four years growth will yield ſubſtantial ſets, to be planted at eight or ten feet diſtance; and for the firſt three years well defended from the cattle, who infinitely delight in their leaves, green or withered. Thus a Willow may continue twenty or five-and-twenty years, with good profit to the induſtrious planter, being headed every four or five years; ſome have been known to ſhoot no leſs than twelve feet in one year, after which the old rotten dotards may be felled, and eaſily ſupplied: But if you have ground fit for whole copſes of this wood, caſt it into double dikes, making every foſs near three feet wide, and two and a half in depth; then leaving four feet at leaſt of ground for the earth (becauſe in ſuch plantations the moiſture ſhould be below the roots, that they may rather ſee than feel the water) and two tables of ſets on each ſide, plant the ridges of theſe banks with but one ſingle table, longer and bigger than the collateral, viz. three, four, five, or ſix feet high, and diſtant from each other about two yards. Theſe banks being carefully kept weeded for the firſt two years, till the plants have vanquiſhed the graſs, and not cut till the third, you may then lop them traverſe, and not obliquely, at one foot from the ground, or ſomewhat more, and they will head to admiration; but ſuch which are cut at three feet height are moſt durable, as leaſt ſoft and aquatick: They may alſo be graffed betwixt the bark, or budded; and then they become ſo beautiful as to be fit for ſome kind of delightful walks; and this I wiſh were practiſed among ſuch as are ſeated in low and marſhy places, not ſo friendly to other trees. Every acre, at eleven or twelve years growth, may yield you near an hundred load of wood: Cut them in the ſpring for dreſſing, but in the fall for timber and fuel. I have been informed that a Gentleman in Eſſex has lopped no leſs than two thouſand yearly, all of his own planting. It is far the ſweeteſt of all our Engliſh fuel, Aſh not excepted, provided it be ſound and dry; and, emitting little ſmoak, is the fitteſt for Ladies chambers; and all thoſe woods and twigs ſhould be cut either to plant, work with, or burn in the drieſt time of the day.

To confirm what we have advanced in relation to the profit which may be made by this huſbandry, ſee what comes to me from a worthy perſon whom we ſhall have occaſion to mention, with great reſpect, in the chapter of Quickſets.

The conſiderable improvement which may be made in common fields as well as incloſed grounds, he demonſtrates by a little ſpot of meadow of about a rod and half; part of which being planted, about fifty years ſince, with Willows, (in a clump not exceeding four poles in length, on one ſide about twelve) ſeveral of them at the firſt and ſecond lopping, being left with a ſtrait top, run up, like Elms, to thirty or forty feet in height; which ſome years ſince yielded boards of fourteen or fifteen inches broad, as good for flooring and other purpoſes within doors, as deals, laſt as long, work finer, white and beautiful: It is indeed a good while ſince they were planted, but it ſeems the crop anſwered his patience, when he cut up as many of them (the year 1700) as were well worth ten pounds; and ſince that another tree, for which, with thoſe that were left, a joiner offered him as much, which was more by half than the whole ground itſelf was worth; ſo as having made twenty pounds of the ſpot, he ſtill poſſeſſes it without much damage to the graſs. The method of planting was firſt by making holes with an iron crow, and widening them with a ſtake of wood, fit to receive a luſty plant, and ſometimes boring the ground with an auger; but neither of theſe ſucceeding, (by reaſon the earth could not be rammed ſo cloſe to the ſides and bottom of the ſets as was requiſite to keep them ſteady, and ſeclude the air, which would corrupt and kill the roots) he cauſed holes, or little pits, of a foot ſquare and depth to be dug, and then making a hole with the crow in the bottom of the pits to receive the ſet, and breaking the turf which came out of it, rammed it in with the mould cloſe to the ſets (as they would do to fix a gate-poſt) with great care not to gall the bark of it. He had divers times before this miſcarried, when he uſed formerly to ſet them in plain ground, without breaking the ſurface, and laying it cloſe to the ſets; and therefore, if the ſoil be moiſt, he digs a trench by the ſide of the row, and applies the mould which comes out of it about the ſets; ſo that the edge of the bank, raiſed by it, may be ſomewhat higher than the earth next the ſet, for the better deſcent of the rain, and advantage of watering the ſets in dry weather; preventing likewiſe their rooting in the bank, which they would do if the ground next the plant or ſet were made high, and ſloped; and being left

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unfenced, cattle would tread down the bank, and lay the roots bare; the ground ſhould therefore not be raiſed above two or three inches towards the body of the ſet. Now if the ground be dry, and want moiſture, he chooſes to bank them round, the foſſes environing the mound and hillock. which being reſerves for the rain, cools and refreſhes the ſets.

He farther inſtances, that Willows of about twenty years growth have been worth thirty ſhillings, and another ſold for three pounds, which was well worth five pounds; and affirms, that the Willows planted in beds, between double ditches, in boggy ground, may be fit to be cut every five years, and pay as well as the beſt meadow-paſture; which is an extraordinary improvement.

26. There is a ſort of Willow of a ſlender and long leaf, reſembling the ſmaller Ozier, but riſing to a tree as big as the Sallow, full of knots, and of a very brittle ſpray, only here rehearſed to acknowledge the variety.

27. There is likewiſe the Garden-Willow, which produces a ſweet and beautiful flower, fit to be admitted into our hortulan ornaments, and may be ſet for partitions of ſquares; but they have no affinity with the others. There is alſo in Shropſhire, another very odoriferous kind, extremely fit to be planted by pleaſant rivulets, both for ornament and profit: It is propagated by cuttings or layers, and will grow in any dry bottom, ſo it be ſheltered from the ſouth, affording a wonderful and early relief to the induſtrious bee. Vitruvius commends the Vitex of the Latines (impertinently called Agnus Caſtus, the one being but the interpretation of the other) as fit for building; I ſuppoſe they had a ſort of better ſtature than the ſhrub growing among the curious with us, and which is celebrated for its chaſte effects, and for which the Antients employed it in the rites of Ceres: I rather think it more convenient for the ſculptor, which he likewiſe mentions, provided we may, with ſafety, reſtore the text, as Perrault has attempted, by ſubſtituting Levitatem for the author's Rigiditatem, ſtubborn materials being not ſo fit for that curious art.

28. What moſt of the former enumerated kinds differ from the Sallows, is indeed not much conſiderable, they being generally uſeful for the ſame purpoſes; as for boxes, ſuch as apothecaries and goldſmiths uſe; for cart ſaddle-trees, yea gun-ſtocks and half-pikes; harrows, ſhoemakers laſts, heels, clogs for pattens; forks, rakes, eſpecially the teeth, which ſhould be

wedged with Oak; but let them not be cut for this when the ſap is ſtirring, becauſe they will ſhrink; for pearches, rafters for hovels, portable and light ladders, hop-poles, ricing of kidney-beans, and ſupporters to Vines, when our Engliſh vineyards come more in requeſt: Alſo for hurdles, ſieves, lattices; for the turner, kyele-pins, great town-tops; for platters, little caſks and veſſels, eſpecially to preſerve verjuices in, the beſt of any. Pales are made of cleft Willow; alſo dorſers, fruit-baſkets, cans, hives for bees, trenchers, trays, &c. and for poliſhing and whetting table-knives the butler will find it above any wood or whetſtone; it makes coals, bavin, and excellent firing, not forgetting the freſh boughs; which, of all the trees in nature, yield the moſt chaſte and cooleſt ſhade in the hotteſt ſeaſon of the day; and this umbrage ſo wholeſome, that phyſicians preſcribe it to feveriſh perſons, permitting them to be placed even about their beds, as a ſafe and comfortable refrigerium. The wood being preſerved dry, will dure a very long time*; but that which is found wholly putrefied, and reduced to a loamy earth in the hollow trunks of ſuperannuated trees, is, of all other, the fitteſt to be mingled with fine mould, for the raiſing our choiceſt flowers, ſuch as Anemonies, Ranunculuſes, Auriculas, and the like.

Quid majora ſequar? Salices, humileſque geniſtæ,
Aut illæ pecori frondem, aut paſtoribus umbram
Sufficiunt, ſepemque ſatis & pabula melli. GEORG. ii.

What would we more? Low Broom, and Sallows wild,
Or feed the flock, or ſhepherd's ſhade, or field
Hedges about, or do us honey yield.

29. Now by all theſe plantations of the aquatick trees, it is evident the Lords of mooriſh commons and unprofitable waſtes may learn ſome improvement, and the neighbour bees be gratified, and many tools of huſbandry become much cheaper. I conclude with the learned Stephanus's note upon theſe kind of trees, after he has enumerated the univerſal benefit of the Salictum: *Nullius enim tutior reditus, minoriſve impendii, aut tempeſtatis ſecurior.*

NOTES.

* Willows, and all the ſoft woods, when uſed for poles or other purpoſes, ſhould be ſtripped of their bark and ſteeped in water for ſome months, which will prevent the worm, and render the wood extremely durable.

DENDROLOGIA.

BOOK THE SECOND.

CHAP. I.

The FIR, PINE, PINASTER, PITCH-TREE, LARCH, AND SUBTERRANEAN TREES. *

BOOK II. 1. ABIES, Picea, Pinus, Pinaſter, Larch, &c. are all of them eaſily raiſed of the kernels and nuts, which may be gotten out of their polyſperm and turbinate cones, clogs, and ſquams, by expoſing them to the ſun, or a little before the fire, or in warm water, till they begin to gape, and are ready to deliver themſelves of their numerous burdens.

FIR. 2. There are of the Fir two principal ſpecies; the Picea, or Male, which is the bigger tree, very beautiful and aſpiring, and of an harder wood, and hirſute leaf; and the Silver Fir, or Female. I begin with the firſt: The boughs whereof are flexible and bending; the cones dependent, long and ſmooth, growing from the top of the branch; and where gaping, yet retain the ſeeds in their receptacles, when freſh gathered, giving a grateful fragrancy of the roſin: The fruit is ripe in September. But after all, for a perfecter account, the true and genuine Fir-tree is a noble up-

NOTES.

* Of this genus of plants there are various ſpecies

1. PINUS *(Sylveſtris)* foliis geminis; primordialibus ſolitariis glabris. Hort. Cliff. 450. *Pine-tree with two leaves in each ſheath, but the firſt leaves are ſingle.* Pinus Sylveſtris C. B. P. 491. *The Wild Pine, or Scotch Fir-tree.*

This is called by us the Scotch Fir, becauſe it grows naturally on the Highlands of Scotland, where the ſeeds, falling from their cones, come up and propagate themſelves without any care. But it is not in Scotland only that theſe trees thrive naturally; for they grow ſpontaneouſly in Denmark, Norway, and Sweden. And though, from the above inſtances, it would ſeem that they delighted princi-

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The Scotch Fir Tree.

A. Miller del. & sc.

Published June 1st 1804 by J. Johnson St Paul's Church Yard



The Weymouth Pine Tree.

Published as the Act directs by J. Hunter, H.S. 1st May 1804.

right tree from the ground, ſmooth and even to the eruption of the branches, which they call the Sapinum, and thence tapering to the ſummit of the Fuſterna: The arms and branches, with Yew-like leaves, grow from the ſtem oppoſite to one another, ſeriatim to the top, as do all cone-bearers, diſcovering their age; which in time, with their weight, bend them from their natural tendency, which is upright, eſpecially toward the top of aged trees, where the leaf is flattiſh, and not ſo regular; the cone great and hard, pyramidal, and full of winged ſeeds.

The Silver Fir, of a whitiſh colour, like Roſemary, under the leaf, is diſtinguiſhed from the reſt by the pectinal ſhape of it: The cones not ſo large as the Picea, grow alſo upright, and this they call the Female: For

NOTES.

pally in theſe northern parts; yet when the plants are properly raiſed and planted out, no climate comes amiſs to them, for they will thrive and grow to be good timber-trees in almoſt any part of the world.——The timber of this tree is what we call Deal, which is ſometimes red, ſometimes yellow, but chiefly white. For the manner of collecting the ſeeds and ſowing them, ſee p. 51.

2. PINUS *(Strobus)* foliis quinis margine ſcabris; cortice lævi. Gron Virg. 152. Pinus Canadenſis quinquefolia, floribus albis, conis oblongis pendulis, ſquamis abieti fere ſimilibus. Duham. Arb. 2. p. 127. Pinus Virginiana, conis longis non ut in vulgari echinatis. Pluk. Alm. 297. *The Weymouth Pine.*

This grows naturally in moſt parts of North-America, where it is called the White Pine. It is one of the talleſt trees of all the ſpecies, often growing a hundred feet high in thoſe countries, as I have been credibly informed. The bark of this tree is very ſmooth and delicate, eſpecially when young; the leaves are long and ſlender, five growing out of each ſheath; the branches are pretty cloſely garniſhed with them, ſo make a fine appearance; the cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring, ſo that if they are not gathered in winter, the ſcales open and let out the ſeeds. The wood of this ſort is eſteemed for making maſts for ſhips; it is in England titled Lord Weymouth's, or New-England Pine. As the wood of this tree was generally thought of great ſervice to the navy, there was a law made in the ninth year of Queen Ann for the preſervation of the trees, and to encourage their growth in America; and it is within theſe forty years that theſe trees began to be propagated in England in any plenty, though there were ſome large trees of this ſort growing in two or three places long before, particularly at Lord Weymouth's, and Sir Wyndham Knatchbull's in Kent; and it has been chiefly from the ſeeds of the latter that the much greater number of theſe trees now in England have been raiſed; for although there has annually been ſome of the ſeeds brought from America, yet

BOOK II. I find botaniſts not unanimouſly agreed about the ſexes of trees. The layers, and even cuttings of this tree, take root, and improve to trees, though more naturally by its winged ſeeds: But the maſculine Picea will endure no amputation, nor is comparable to the Silver Fir for beauty, or ſo fit to adorn walks and avenues. Tho' the other alſo be a very ſtately plant, yet it has this infirmity, that tho' it remain always green, it ſheds the old leaves more viſibly, and not ſeldom breaks down its ponderous branches: Beſides, the timber is nothing ſo white; though yet even that colour be not always the beſt character: That which comes from Bergen, Swinſund, Mott, Longland, Dranton, &c. (which experienced workmen call the Dram) being long, ſtrait, and clear, of a yellow and more cedary colour, is eſteemed much before the White for flooring and wainſcot, for

NOTES.

; theſe have been few in compariſon to the produce of the trees in Kent; and many of the trees which have been raiſed from the ſeeds of thoſe now produce plenty of good ſeeds, particularly the trees in the gardens of his Grace the Duke of Argyle at Whitton, which annually produce large quantities of cones.——This ſort and the Scotch Pine are the beſt worth cultivating of all the kinds for the ſake of their wood; the others may be planted for variety in parks, &c. where they make a good appearance in winter, when other trees are deſtitute of leaves.

3. PINUS *(Pinea)* foliis geminis; primordialibus ſolitariis ciliatis. *Pine-tree with two gray leaves coming out of each ſheath, and the firſt leaves ſingle.* Pinus ſativa. C. B. P. 490. *The cultivated Pine-tree,* commonly called *the Stone Pine.*

The Stone Pine is a tree of which there ſhould be a few in all plantations of evergreens. It will grow to a conſiderable height, and ariſes with a ſtraight and fair ſtem, though with a rough bark. The leaves will contribute to the diverſifying of the ſcene, as they differ in colour from the other ſorts, and are arranged in a different manner. The cones which it bears are monſtrouſly large and turbinated; they ſtrike the eye by their bold appearance when hanging on the trees, and afford pleaſure upon being more cloſely examined, from the beautiful arrangement of their ſcales. They produce a large kernel as ſweet to the taſte as an Almond, which formerly were kept in the ſhops, and ſold for reſtoratives, but are at preſent neglected.——This tree is a native of Italy, where the kernels are ſerved up in deſerts at the table; they are thought to be ſalutary in colds, coughs, and conſumptions.——The Stone Pine may be ſawed into good boards, though the timber is generally allowed not to be quite ſo valuable as the other ſorts. The colour is not the ſame in all trees; ſome exhibiting their timber of a very white colour, others again are yellower, and ſmell ſtronger of the turpentine.

4. PINUS *(Tæda)* foliis longioribus tenuioribus ternis, conis maximis laxis. *Pine-tree with three longer narrower leaves, and the largeſt looſe cones.* Pinus Virginiana

maſts, &c. thoſe of Pruſſia, which we call Spruce, and Norway, eſpecially from Gottenberg, and about Riga, are the beſt; unleſs we had more commerce of them from our plantations in New-England, which are preferable to any of them; there lying rotting at preſent at Paſcataway a maſt of ſuch prodigious dimenſions, as nobody will adventure to ſhip and bring away. All theſe bear their ſeeds in conic figures, after an admirable manner and cloſeneſs, to protect their winged ſeeds.

The Hemlock-tree, as they call it in New-England, is a kind of Spruce. In the Scottiſh Highlands are trees of wonderful altitude (though not altogether ſo tall, thick, and fine as the former) which grow upon places ſo

NOTES.

tenuifolia tripilis, ſc. ternis plerumque ex uno foliculo ſetis, ſtrobilis majoribus. Pluk. Alm. 297. *Virginian Pine-tree with three narrow leaves in each ſheath, and larger cones. The Swamp Pine-tree.*

This is a very large growing tree, and is highly proper, as its name imports, to be planted in moiſt places.——The leaves are long, of a delightful green colour; three iſſue out of each ſheath, and adorn the younger branches in great plenty.—Its propagation is the ſame as the Weymouth Pine; and the planting out, and after-management of the trees, ſhould be exactly ſimilar.——It will grow well on all upland and dry grounds; but it chiefly delights in moiſt places.

5. PINUS *(Cembra)* foliis quinis lævibus. It. Scan. 32. Laryx ſempervirens, foliis quinis, nucleis edulebus. Breyn. E. N. C. Cent. 7. Obſ. 2. *The Cembra Pine.*

The Cembra Pine is a fine tree; the leaves are very beautiful, being of a lighter green than moſt of the ſorts, and are produced five in a ſheath. They are long and narrow; and as they cloſely ornament the branches all round, they look beautiful, and render the tree on that account very valuable. The cones of this tree alſo have a good effect; for they are larger than thoſe of the Pineaſter, and the ſquamæ are beautifully arranged.——This tree is a native of the Alps, and is well deſcribed by Mr. Harte, in his elegant Eſſays on Huſbandry, under the title of *Aphernouſti* Pine. He conſiders it as a tree likely to thrive with great advantage on our bleak, barren, rocky, and mountainous lands; even near the ſea, and in north or north-eaſterly aſpects, where ſomething of this hardy kind is much wanted. The timber is large and has many uſes, eſpecially within doors, or under cover. The bark of the trunk or bole of the tree is not reddiſh like the bark of the Pine, but of a whitiſh caſt, like that of the Fir. The ſhell which incloſes the kernel is eaſily cracked, and the kernels are covered with a brown ſkin which peels off. They are about the ſize of a common pea, triangular like buck-wheat, and white and ſoft as a blanched almond, of an oily agreeable taſte, but leaving in the mouth *that* ſmall degree of aſperity which is peculiar to wild fruits, and not unpleaſing. Theſe kernels ſometimes make a part in a Swiſs de-

BOOK II.

inacceſſible, and far from the ſea, that, as one ſays, they ſeem to be planted by God on purpoſe for nurſeries of ſeed, and monitors to our induſtry, reſerved with other bleſſings, to be diſcovered in our days amongſt the new-invented improvements of huſbandry, not known to our ſouthern people of this nation. Did we conſider the pains they take to bring them out of the Alps, we ſhould leſs ſtick at the difficulty of tranſporting them from the utmoſt parts of Scotland. To the former ſorts we may add the Eſterund Firs, Tonſberry, Frederickſtadt, Hellerone, Holmſtrand, Landifer, Stravenger, Lawrwat, &c. There is likewiſe a kind of Fir called in Dutch the Green-boome, much uſed in building of ſhips, though not for men of war, becauſe of its lightneſs, and that it is not ſo ſtrong as

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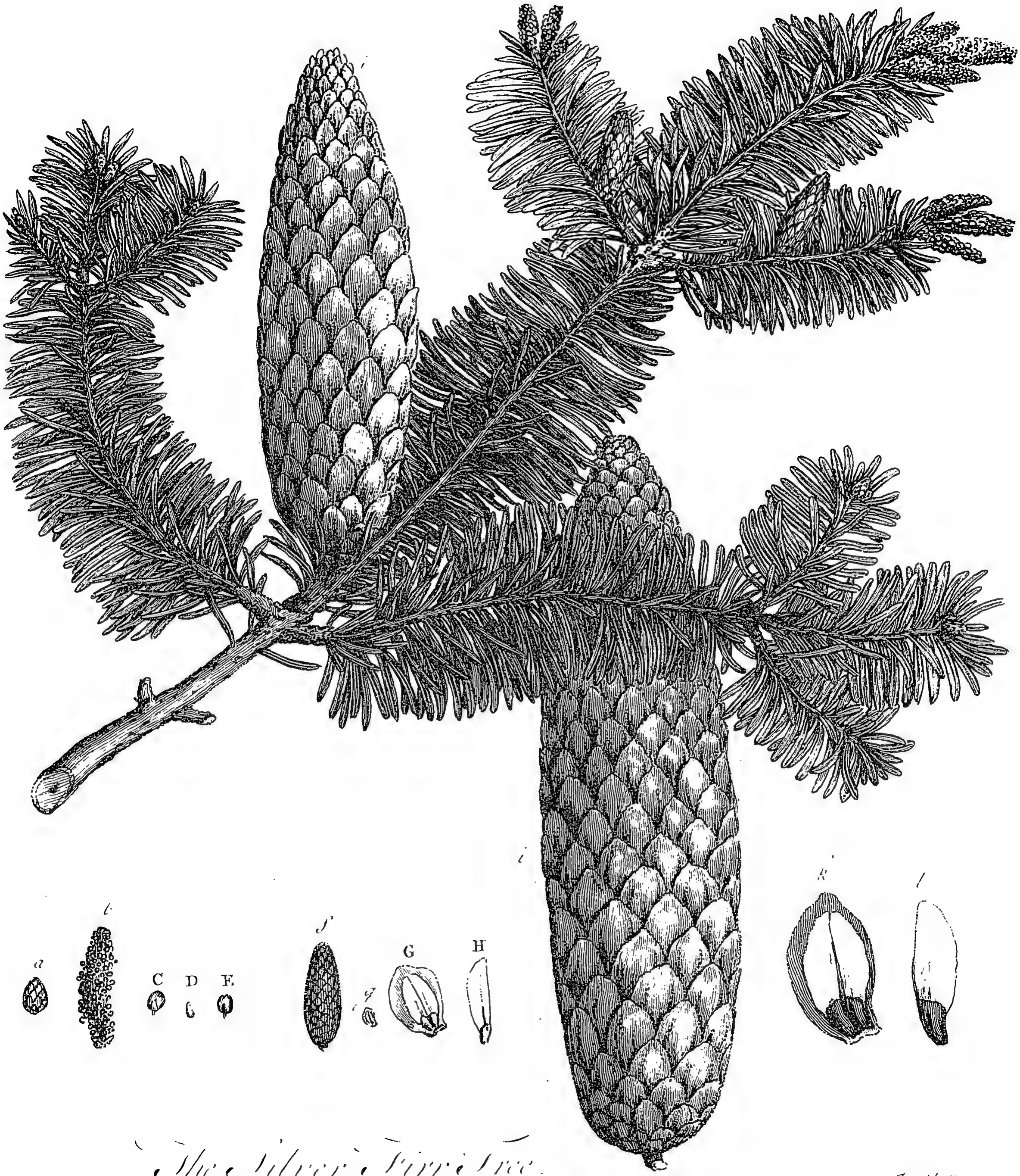
ſert. Wainſcotting, flooring, and other joiners work, made with the planks of Aphernouſli, are of a finer grain, and more beautifully variegated than deal, and the ſmell of the wood is more agreeable. From this tree is extracted a white odoriferous reſin. On this occaſion the curious planter may conſult a very ſcarce piece, *De Arboribus Coniferis*, written about 200 years ago, by Pietro Belloni.—In the plantations belonging to Jeremiah Dixon, Eſq; at Gleddow near Leeds, may be ſeen ſeveral of theſe Pines. They are there called the Gleddow Pine.

6. PINUS (*Picea*) foliis ſolitariis emarginatis. Lin. Sp. Pl. 1420. Abies taxi folio, fructu ſurſum ſpectante. Tourn. Inſt. 585. Abies conis ſurſum ſpectantibus. f. maſ. Bauh. Pin. 505. *The Silver Fir-tree.*

This is a noble upright tree. The branches are not very numerous, and the bark is ſmooth and delicate. The leaves grow ſingly on the branches, and their ends are ſlightly indented. Their upper ſurface is of a fine ſtrong green colour, and their under has an ornament of two white lines, running lengthways on each ſide the midrib, on account of which ſilvery look this ſort is called the Silver Fir. The cones are large, and grow erect; and when the warm weather comes on, they ſoon ſhed their ſeeds; which ſhould be a caution to gather the cones before that happens——This tree is common in the mountainous parts of Scotland, and in Norway, and affords the yellow deals. From its yielding pitch, it has obtained the title of *Picea*, or Pitch-tree.

7. PINUS (*Abies*) foliis ſolitariis ſubulatis mucronatis lævibus bifariam verſis. Lin. Sp. Pl. 1421. Abies foliis ſolitariis apice acuminatis. Hort. Cliff. 445. *The common Spruce Fir-tree.*

The Spruce Fir is a beautiful tree, as well as a valuable one for its timber, producing the white deal. It is a native of Norway and Denmark, where it grows ſpontaneouſly, and is one of the principal productions of their woods. It alſo grows plentifully in the Highlands of Scotland, where it adorns thoſe cloud capped mountains with a conſtant verdure. The long-coned Corniſh Fir is a variety of



The Silver Fir Tree.

Published as the Act directs by J. & A. Arch Cornhill

J. C. Miller del. Sculp.



The Spruce Fir Tree.

Published June 1st 1838 by Chas. Tilt 86 Fleet Street.

Oak; but yet proper enough for veſſels of great burden, which ſtand much out of the water: This ſort comes into Holland from Norway, and other Eaſtland countries; it is ſomewhat heavier yet than Fir, and ſtronger, nor do either of them bend ſufficiently. As to the ſeeds, they may be ſown in beds or caſes at any time during March; and when they peep, carefully defended with Furzes, or the like fence, from the rapacious birds, which are very apt to pull them up, by taking hold of that little infecund part of the ſeed, which they commonly bear upon their tops: The beds wherein you ſow them had need be ſheltered from the ſouthern aſpects, with ſome ſkreen of reed, or thick hedge: Sow them in ſhallow rills, not above half an inch deep, and cover them with fine light mould;

NOTES.

this tree, and differs ſcarcely in any reſpect, except that the leaves and the cones are larger. As Gardeners generally receive it as a diſtinct Fir, I thought it not amiſs to mention it here; though I muſt own the difference is ſo inconſiderable as to make it hardly worth ſeeking after; and though the cones are rather longer than the other ſort, yet of that alſo the cones are very large, oftentimes near a foot; ſo that they may eaſily paſs the one for the other, as they both hang down alike. The varieties of the Norway Spruce go by the names of Picea major prima, ſive Abies rubra: Abies alba, ſive fæmina, & Abies minor.

8. PINUS *(Cedrus)* foliis faſciculatis acutis. Hort. Cliff. 449. Cedrus Coniſera, foliis Laricis. B. P. 450. Cedrus Libani. Barr. Ic. 499. *The Cedar of Lebanon.*

This tree is now claſſed with the Pine; but as Mr. Evelyn has a ſeparate chapter upon it, I ſhall, in this place, only give its botanical deſcription.

9. PINUS *(Larix)* foliis faſciculatis obtuſis. Lin. Sp. Pl. 1420. Larix, folio deciduo, conifera. B. P. 1. p. 263. *The Larch-tree.*

This tree is of quick growth, and will riſe to the height of fifty feet; the branches are ſlender, and their ends generally hang downward. Theſe are garniſhed with long narrow leaves, which ariſe in cluſters from one point, and ſpread open above like the hairs of a painter's bruſh; they are of a light green, and fall away in autumn like other deciduous trees. In the month of April the male flowers appear, which are diſpoſed in form of ſmall cones; the female flowers are collected into oval obtuſe cones, which in ſome ſpecies have bright purple tops, and in others they are white: theſe differences are accidental, for I have found the ſeeds taken from either of theſe varieties, will produce plants of both ſorts; the cones are about one inch long, obtuſe at their points, and the ſcales lie over each other, and are ſmooth; under each ſcale there is generally lodged two ſeeds which have wings.——The Larch is a native of the Alps and Appenine mountains, and is now very common in all the nurſeries of this kingdom. It is remarked that thoſe

Book II. being riſen a finger in height, eſtabliſh their weak ſtalks by ſifting ſome more earth about them, eſpecially the Pines, which being more top-heavy, are more apt to ſwag. When they are of two or three years growth, you may tranſplant them where you pleaſe; and when they have gotten good root, they will make prodigious ſhoots, but not for the three or four firſt years comparatively. They will grow both in moiſt and barren gravel and poor ground, ſo it be not over ſandy and light, and want a loamy ligature; but before ſowing (I mean here for large deſigns) turn it up a foot deep, ſowing or ſetting your ſeeds an hand diſtance, and riddle earth upon them; in five or ſix weeks they will peep. When you tranſplant, water them well before, and cut the clod out about the root, as you do melons

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trees which have been planted in the worſt ſoils, and moſt expoſed ſituations, have thriven the beſt, which is a great encouragement. Some trees cannot bear too great a luxuriancy, and this tree in particular is apt to grow top-heavy from too much ſhelter and nouriſhment. Theſe trees, when planted, ſhould be put into clumps, and not as ſingle trees; neither ſhould the plants be taken from very warm nurſeries, if intended to be placed out upon expoſed ſituations, but rather raiſed as near the ſpot as poſſible, taking care that the ſoil be good. When they are intended to grow large, they ſhould not exceed three or four years when planted; for though trees of a greater ſize will remove very well, yet experience has ſhewn us that the youngeſt trees, with good roots, bear the change of ſituation the beſt. The Larch is a tree as yet but little known in this kingdom; but there is great reaſon to apprehend that it will prove a very important acquiſition to the planter. In Switzerland they cover the roofs of their houſes with ſhingles made of Larch. Theſe are generally cut about one foot ſquare, and half an inch in thickneſs, which they nail to the rafters. At firſt the roof appears white, but in two or three years it becomes as black as coal, and all the joints are ſtopped by the reſin which the ſun extracts from the pores of the wood. This ſhining varniſh renders the roof impenetrable to wind or rain. It makes a cheap covering, and, as ſome ſay, an incombuſtible one; but this is rather doubtful.—From this tree is extracted what we erroneouſly call *Venice Turpentine*. This ſubſtance, or natural balſam, flows, at firſt, without inciſion; when it has done dropping, the poor people, who wait in the Fir-woods, make inciſions, at about two or three feet from the ground, into the trunk of the trees, and into theſe they fix narrow troughs, about twenty inches long. The end of theſe troughs is hollowed, like a ladle; and in the middle is a ſmall hole bored, for the turpentine to run into a receiver, which is placed below it. As the gummy ſubſtance runs from the trees, it paſſes along the ſloping gutter, or trough, to the ladle, and from thence runs through the holes into the receiver. The people who gather it viſit the trees morning and evening, from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, the tur-



The Larch Tree.

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J. C. Miller del. & sc.

out of the hot-bed, which knead cloſe to them like an egg: Thus they may be ſent ſafely many miles, but the top muſt neither be bruiſed, nor much leſs cut, which would dwarf it for ever: One kind alſo will take of ſlips or layers, interred about the latter end of Auguſt, and kept moiſt.

3. The beſt time to tranſplant, were in the beginning of April; they will thrive mainly in a ſtiff, hungry clay, or rather loam; but by no means in over light, or rich ſoil: Fill the holes therefore with ſuch barren earth, if your ground be improper of itſelf; and and if the clay be too ſtiff and untractable, with a little ſand, removing them with as much earth about the roots as is poſſible, though the Fir will better endure a naked tranſ-

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pentine is clear, like water, and of a yellowiſh white; but, as it grows older, it thickens, and becomes of a citron colour. It is procured in greateſt abundance in the neighbourhood of Lyons, and in the valley of St. Martin, near Lucern, in Switzerland.

10. PINUS *(Canadenſis)* foliis ſolitariis linearibus obtuſiuſculis ſubmembranaceis. Lin. Sp. Plan. 1421. Abies foliis ſolitariis confertis obtuſis membranaceis. Gron. Virg. 191. *The Canada Pine.*

This is a native of North-America, from whence the ſeeds were brought to England. This tree by the natives is called the White Spruce Pine. It grows on the mountains and higher lands, and arrives at a much greater ſize than many of the other ſorts.

This genus of plants belongs to the claſs and order *Monœcia Monodelphia*, there being male and female flowers on the ſame plant, and the ſtamina joined in one body at their baſe.

All the ſorts of Pines are produced from ſeeds which grow in hard woody cones. Theſe ſeeds are got by laying the cones before a very gentle fire, or rather by expoſing them to the beams of the ſun, and often turning them. The ſeeds of the Larch-tree are particularly difficult to ſeparate from the cone, ſo that we are generally obliged to be at the expence of ſlitting the cones into quarters with knives; an operation both tedious and expenſive.

"The beſt ſeaſon for ſowing the ſeeds of Pines is about the end of March; and "when the ſeeds are ſown the beds ſhould be covered with nets, otherwiſe, when the "plants begin to appear with the huſk of the ſeed on their heads, the birds will pick "them off and deſtroy them.

"Where the quantity of ſeeds to be ſown is not great, it will be a good way to ſow "them either in boxes or pots, filled with light loamy earth, which may be removed "from one ſituation to another, according to the ſeaſon of the year; but if there is a "large quantity of the ſeeds, ſo as to require a good ſpace to receive them, they ſhould

Book II. plantation than the Pine: If you be neceſſitated to plant towards the latter end of ſummer, lay a pretty deal of horſe-litter upon the ſurface of the ground, to keep off the heat, and in winter the cold; but let no dung touch either ſtem or root: You may likewiſe ſow in ſuch earth about February; they will make a ſhoot the very firſt year of an inch; next an handful; the third year three feet, and thenceforward above a yard annually. A northern Gentleman (who has obliged me with this proceſs upon his great experience) aſſures me that Fir, and this Feralis Arbor, as Virgil calls the Pine, are abundantly planted in Northumberland, which are in few years grown to the magnitude of ſhip-maſts; and from all that has been

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" be ſown on an eaſt or north-eaſt border, where they may be ſcreened from the ſun,
" whoſe heat is very injurious to theſe plants at their firſt appearance above ground.
" Thoſe ſeeds which are ſown in pots or boxes, ſhould alſo be placed in a ſhady ſitua-
" tion, but not under trees; and if they are ſcreened from the ſun with mats at the
" time when the plants firſt come up, it will be a good method to preſerve them.

" Moſt of the ſorts will come up in about ſix or ſeven weeks after they are ſown;
" but the ſeeds of the Stone or cultivated Pine, and two or three of the others, whoſe
" ſhells are very hard, frequently lie in the ground a whole year; ſo that when the
" plants do not come up the firſt year, the ground ſhould not be diſturbed, but kept
" clean from weeds, and the following ſpring the plants will riſe. This frequently
" happens in dry ſeaſons, and when they are ſown in places a little too much expoſed
" to the ſun. Therefore the ſureſt method is, to ſoak the ſeeds in water twenty-four
" hours before they are ſown.

" When the plants appear, they muſt be conſtantly kept clean from weeds; and in
" very dry ſeaſons, if they are now and then gently refreſhed with water, it will for-
" ward their growth; but this muſt be done with great care and caution, for if they
" are haſtily watered, it will waſh the tender plants out of the ground, or lay them
" down flat, which often rots their ſhanks; ſo that unleſs it be judiciouſly performed,
" it will be the beſt way to give them no water, but only ſcreen them from the ſun.

" If the plants come up too cloſe, it will be a good method to thin them gently
" about the middle of July. The plants which are drawn up may then be planted on
" other beds which ſhould be prepared ready to receive them, for they ſhould be im-
" mediately planted as they are drawn up, becauſe their tender roots are ſoon dried
" and ſpoiled at this ſeaſon of the year. This work ſhould be done, if poſſible, in
" cloudy or rainy weather, and then the plants will draw out with better roots, and
" will ſoon put out new fibres again; but if the weather ſhould prove clear and dry,
" the plants ſhould be ſhaded every day from the ſun with mats, and now and then
" gently refreſhed with water. In drawing up the plants, there ſhould be great care
" taken not to diſturb the roots of the plants left remaining in the ſeed-beds; ſo
" that if the ground be hard, the beds ſhould be well watered ſome time before the
" plants are thinned, to ſoften and looſen the earth; and if after the plants are drawn

ſaid, deduces theſe encouragements: 1. The facility of their propagation; 2. the nature of their growth, which is to affect places where nothing elſe will thrive; 3. their uniformity and beauty; 4. their perpetual verdure; 5. their ſweetneſs; 6. their fruitfulneſs, affording ſeed, gum, fuel, and timber, of all other woods the moſt uſeful and eaſy to work; all which highly recommend it as an excellent improvement of huſbandry, fit to be enjoined by ſome ſolemn edict to the inhabitants of this our iſland, that we may have maſts, and thoſe other materials of our own growth. In planting the Silver Abies, ſet not the roots too deep; it affects the ſurface more than the reſt.

PINE.

4. The Pine (of which are reckoned no leſs than ten ſeveral ſorts, preferring the domeſtic, or ſative, for the fuller growth) is likewiſe of both

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" out, the beds are again gently watered to ſettle the earth to the roots of the remain-
" ing plants, it will be of great ſervice to them, but it muſt be done with great care,
" ſo as not to waſh out their roots, or lay down the plants. The diſtance which
" ſhould be allowed theſe plants in the new beds, may be four or five inches row from
" row, and three inches in the rows.

" Let the plants remain in the ſeed-bed till the ſpring twelvemonth, by which
" time they will be fit to tranſplant where they are to remain for good, for the younger
" the plants are when planted out, the better they will ſucceed; for although
" ſome ſorts will bear tranſplanting at a much greater age, yet young plants planted
" at the ſame time will, in a few years, overtake the large ones, and ſoon outſtrip
" them in their growth; and there is this advantage in planting young, it ſaves
" the expence of ſtaking, and much watering, which large plants require. I have
" often ſeen plantations of ſeveral ſorts of Pines, which were made of plants ſix
" or ſeven feet high, and at the ſame time others of one foot high planted between
" them, which in ten years were better trees than the old ones, and much more vigo-
" rous in their growth; but if the ground where they are deſigned to remain cannot
" be prepared by the time before-mentioned, the plants ſhould be planted out of the
" beds into a nurſery, where they may remain two years, but not longer; for it will
" be very hazardous to remove theſe trees at a greater age.

" The beſt ſeaſon to tranſplant all the ſorts of Pines is about the latter end of March
" or the beginning of April, juſt before they begin to ſhoot; for altho' the Scotch Pine,
" and ſome of the moſt hardy ſorts, may be tranſplanted in winter, eſpecially when
" they are growing in ſtrong land, where they may be taken up with balls of earth to
" their roots; yet this is what I would not adviſe for common practice, having fre-
" quently ſeen it attended with bad conſequences; but thoſe which are removed in the
" ſpring rarely fail.

" Where theſe trees are planted in expoſed ſituations, they ſhould be put pretty cloſe
" together, that they may ſhelter each other; and when they have grown a few years,

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ſexes, whereof the male growing lower, with a rounder ſhape, hath its wood more knotty and rude than the female; it is lank, longer, narrow, and pointed; bears a black, thick, large cone, including the kernel within an hard ſhell, covered under a thick ſcale: The nuts of this tree (not much inferior to the Almond) are uſed, among other ingredients, in beatilla-pies at the beſt tables. They ſhould be gathered in June before they gape; and having hung two years (for there will be always ſome ripe, and ſome green on the ſame tree) preſerve them in their nuts, in ſand, as you treat acorns, &c. till the ſeaſon invite, and then ſet or ſow them in ground which is cultivated like the Fir in moſt reſpects; only you may bury the nuts a little deeper. By a friend of mine they were rolled in a fine compoſt made of ſheeps' dung, and ſcattered in February, and this way never failed Fir and Pine; they came to be above an inch high by May; and a Spaniſh author tells us, that to macerate them five days in a child's urine,

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" part of the plants may be cut down to give room for the others to grow; but this " muſt be gradually performed, leſt, by too much opening the plantation at once, the " air ſhould be let in among the remaining trees with too great violence, which will " ſtop their growth.

" Although theſe Evergreen-trees are by many perſons deſpiſed on account of their " dark green in ſummer, yet a proper mixture of them in large clumps makes a fine " appearance about a ſeat in winter; and in ſummer, by their contraſt with other trees, " they have a good effect in diverſifying the ſcene.

" Wherever large plantations are deſigned to be made, it will be proper to form the " nurſery upon a piece of good ground as near the plantation as poſſible; or the cot- " tagers may be induced to raiſe the ſeeds, which will give employment to the women " and children at a time when the farmer has leaſt occaſion for their aſſiſtance.

" The Scotch Pine, as was before obſerved, being the hardieſt of all the kinds, and " the wood of it the moſt uſeful, is the ſort which beſt deſerves our care. This will " thrive upon the moſt barren ſands, where ſcarce any thing elſe, except Heath and " Furze, will grow. There are many thouſand acres of ſuch land lying convenient " for water carriage, (at preſent affording no benefit to the public) that might, by " plantations of theſe trees, become good eſtates to their proprietors, and alſo a na- " tional benefit; and as the legiſlature has taken this into conſideration, and al- " ready paſſed ſome laws for the encouraging theſe plantations, as alſo for their pre- " ſervation and ſecurity, ſo it may be hoped that this improvement will be under- " taken by the Gentlemen who are poſſeſſed of ſuch lands in all the different parts " of the kingdom; for although they may not expect to receive much profit from " theſe plantations in their own time, yet their ſucceſſors will be highly benefited; " and the pleaſure which thoſe growing trees will afford, by beautifying the preſent " dreary parts of the country, will in ſome meaſure recompenſe them for their trouble

and three days in water, is of wonderful effect: This were an expeditious proceſs for great plantations; unleſs you would rather ſet the Pine as they do peas, but at wider diſtances, that when there is occaſion of removal, they might be taken up with the earth and all; I ſay taken up, and not removed by evulſion, becauſe they are, of all other trees, the moſt obnoxious to miſcarry without this caution; and therefore it were much better, where the nuts might be commodiouſly ſet and defended, never to remove them at all, it gives this tree ſo conſiderable a check. The ſafeſt courſe of all, were to ſet the nuts in an earthen pot, and, in froſty weather, ſhewing it a little to the fire, the entire clod will come out with them, which are to be reſerved, and ſet in the naked earth, in convenient and fit holes prepared before-hand, or ſo ſoon as the thaw is univerſal.

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" and expence; and by creating employment for the poor, leſſen thoſe rates which are " now ſo high in many parts of this kingdom.

" The expence of making theſe plantations is what moſt people are afraid of; " but the greateſt expence is that of fencing them from the cattle, &c. for the " other is trifling, as there will be no neceſſity for preparing the ground to receive the " plants; and the charge of planting an acre of land with theſe plants will not be " more than twenty or thirty ſhillings where labour is dear, excluſive of the plants, " which may be valued at forty ſhillings more. I have planted many acres of land " with theſe trees, which were covered with Heath and Furze, and only dug holes " between to put in the plants, and afterward laid the Heath or Furze, which was " cut, upon the ſurface of the ground about their roots, to prevent the ground from " drying—and few of the plants have failed. Theſe plants were moſt of them four " years old from ſeed, nor was there any care taken to clean the ground afterward, " but the whole left to ſhift for themſelves; and in five or ſix years the Pines grew " ſo well as to overpower the Heath and Furze, and deſtroy it.

" The diſtance which I generally allow theſe plants, in all large open ſitua- " tions, is about four feet, but always irregular, avoiding planting in rows as much " as poſſible; and in the planting, great care ſhould be uſed not to take up the plants " faſter than they can be put down, ſo that ſome men ſhould be employed in digging " up the plants while others are planting. Thoſe who take up the plants muſt be " looked after, to ſee they do not tear off the roots, or wound the bark; and as " faſt as they are taken up, their roots ſhould be covered to prevent their drying, and " put into their new quarters as ſoon as poſſible. In planting them, care ſhould be " had to make the holes large enough for their roots, as alſo to looſen and break the " clods of earth, and put the fineſt immediately about their roots, then to ſettle the " earth gently with the foot to the roots of the plant. If theſe things are duly " obſerved, and a proper ſeaſon be choſen for planting, there will be very little " hazard of ſucceſs; but I have ſeen ſome plantations made with plants which

Book II. Some commend the ſtrewing a few oats at the bottom of the foſſes or pits in which you tranſplant the naked roots, for a great promotement of their taking, and that it will cauſe them to ſhoot more in one year than in three: But to this I have already ſpoken. Other kinds not ſo rigid, nor the bark, leaf, cone and nuts ſo large, are thoſe called the Mountain-Pine, a very large ſtately tree. There is likewiſe the Wild or Baſtard-Pine and Teda, clad with thin long leaves, and bearing a turbinated cone: Abundance of excellent roſin comes from this tree. There is alſo the Pinaſter, another of the wild kind; but none of them exceeding the Spaniſh, called by us the Scotch Pine, for its tall and erect growth,

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" were brought from a great diſtance, and had been ſo cloſely packed up as to cauſe a " heat, whereby moſt of the plants within had their leaves changed yellow, and few " of them have grown, which has diſcouraged others from planting, not knowing " the true cauſe of the failure.

" After the plantations are made, the only care they require for five or ſix years, " will be to ſecure the plants from cattle, hares, and rabbits; if theſe are admit- " ted to them, they will make great deſtruction in a ſhort time; for if the branches " are gnawed by hares or rabbits, it will greatly retard the growth of the plants, if " not deſtroy them intirely.

" In about five or ſix years after planting, the branches of the young trees will " have met, and begin to interfere with each other; therefore they will require a " little pruning, but this muſt be done with great caution. The lower tier of " branches only ſhould be cut off; this ſhould be performed in September, at which " time there will be no danger of the wounds bleeding too much, and the turpentine " will harden over the wounds as the ſeaſon grows cold, ſo will prevent the wet " from penetrating the wounds. Theſe branches ſhould be cut off cloſe to the ſtem " of the plants, and care ſhould be taken in doing this, not to break any of the re- " maining branches of the young trees. This work ſhould be repeated every other " year, at each time taking off only the lower tier of branches; for if the plants are " much trimmed, it will greatly retard their growth, as it does in general that of " all trees; but as theſe trees never put out any new ſhoots where they are pruned, ſo " they ſuffer more from amputation than thoſe which do.

" In thoſe parts of France where they have foreſts of theſe trees, the proprietors " always give the fagots to thoſe who prune their young trees firſt for their labour, " ſo it coſts them no money. At the ſecond pruning the proprietor has one-third " of the fagots, and the drivers have the other two for their work; and afterward " the fagots are equally divided between the workmen and proprietors; but there muſt " be great care taken that they do not cut off more than they ought.

" In about twelve or fourteen years time will require no more pruning, for their " upper branches will kill thoſe below where they have not air; but ſoon after this, if

proper for large and ample walks and avenues; ſeveral of the other wild ſorts inclining to grow crooked. But, for a more accurate deſcription of theſe coniferous trees, and their perfect diſtinctions, conſult our Mr. Ray's moſt elaborate and uſeful work, where all that can be expected or deſired, concerning this profitable, as well as beautiful tree, is amply ſet down. Hiſt. Plant. lib. xxv. cap. i.

5. I am aſſured, by a perſon moſt worthy of credit, that in the territory of Alzey, (a country in Germany where they were miſerably diſtreſſed for wood, which they had ſo deſtroyed, as that they were reduced to make uſe of ſtraw for their beſt fuel) a very large tract being newly plowed, (but the wars ſurprizing them they did not ſow) there ſprung up

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" the plants have made good progreſs, it may be neceſſary to thin them; and this " ſhould be gradually performed, beginning in the middle of the plantation firſt, lea- " ving the outſide cloſe to ſcreen thoſe within from the cold, ſo by degrees coming " to them at laſt, whereby thoſe which were firſt thinned will have had time to " get ſtrength, ſo will not be in danger of ſuffering from the admiſſion of cold air. " When theſe plantations are thinned, the trees ſhould not be dug up, but their ſtems " cut off cloſe to the ground; for their roots never ſhoot again, but decay in the " earth, ſo there can no harm ariſe by leaving them, and hereby the roots of the " remaining plants are not injured. The trees which are now cut will be fit for " many purpoſes: Thoſe which are ſtraight will make good putlocks for the bricklay- " ers, and ſerve for ſcaffolding-poles; ſo that there may be as much made by the " ſale of theſe, as will defray the whole expence of the planting, and probably intereſt " of the money beſides.

" As the upright growth of theſe trees renders their wood the more valuable, they " ſhould be left pretty cloſe together, whereby they will draw each other up, and " grow very tall. I have ſeen ſome of theſe trees growing, whoſe naked ſtems have " been more than ſeventy feet high, and as ſtraight as a walking-cane; and from one of " theſe trees there were as many boards ſawed, as laid the floor of a room near twenty " feet ſquare. If theſe trees are left eight feet aſunder each way, it will be ſufficient " room for their growth; therefore if, at the firſt thinning, a fourth part of the trees " are taken away, the others may ſtand twelve or fourteen years longer, by which " time they will be of a ſize for making ladders and ſtandards for ſcaffolding, and " many other purpoſes; ſo that, from this ſale, as much may be made, as not " only to pay the remaining part of the expence of planting, if any ſhould be want- " ing in the firſt, but rent for the land with intereſt."

Although this long extract from Mr. Miller may not perfectly coincide with the ſentiments of every planter of Pines, yet in general I think it will be of uſe.—The following letter, addreſſed to me by James Farquarſon, Elq; of Invercauld upon the method of raiſing

Book II. the next year a whole foreſt of Pine-trees, of which ſort of wood there was none at all within leſs than fourſcore miles; ſo as it is verily conjectured by ſome, they might be wafted thither from the country of Weſtraſia, which is the neareſt part to that where they grow. If this be true, we are no more to wonder how, when our Oak-woods are grubbed up, Beech, and trees of other kinds have frequently ſucceeded them. What ſome impetuous winds have done in this nature, I could produce inſtances almoſt miraculous. I ſhall ſay nothing of the opinion of our Maſter Varro, and the learned Theophraſtus *, who were both of faith that the ſeeds of plants dropped out of the air. Pliny, in book xvi. chap. xxxiii. upon diſcourſe of the Cretan Cypreſs, attributes much to the indoles, and nature of the ſoil, virtue of the climate, and impreſſions of the air. And

* De Cauſis, lib. I. cap. v.

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the Larch and the Scotch Pine, will, I flatter myſelf, be highly acceptable. Such liberal communications deſerve greatly of the public.

Marlee, (Scotland) June 22, 1775.

" ——— In order to raiſe plantations of the Scotch Fir, let the cones be " gathered in the month of February, or March, from thriving young trees, as the " old ones are not eaſily acceſſible, nor ſo productive of ſeed. Theſe are to be expo- " ſed to the heat of the ſun, thinly ſpread on any kind of coarſe canvas, taking them " under cover in the night-time, and only expoſing them when the ſun ſhines. This " ſoon makes the cones expand with a crackling noiſe. When any quantity of the " ſeed is ſhed, it muſt be ſeparated from the cones by a ſearch, otherwiſe the firſt- " dropped ſeeds would become too dry before the cones yielded their whole quantity, " which often takes up a conſiderable time; ſo that we are ſometimes obliged to dry the " cones in kilns, to make them give their contents in time for ſowing—which ought to " be done the end of April or beginning of May. The firſt method of procuring the " ſeed is certainly the moſt eligible, tho' the other anſwers very well when attentively " performed, ſo as not to damage the ſeed by too much heat. A light loamy ſoil, " trenched a foot and a half deep, and laid out in beds five feet broad, anſwers the beſt " for ſowing. Let the ſeeds be ſown very thick, and covered with a thick ſifting of " mould from the alleys. Plants raiſed in this manner will riſe like a bruſh. No " kind of manure ſhould be given to the beds, as productive of weeds; the drawing " of which not only brings up many of the tender plants, but looſens the ground, and " makes blanks that let in froſts in winter and drought in ſummer. To give an idea " of the ſowing, I never conſider my crop of plants good, unleſs I have above a thou- " ſand in each foot long of the beds, that is, in five ſquare feet. Upon their having " two ſeaſons growth, I plant them out irregularly from the ſeed-bed, about three feet " aſunder, upon the mountainous grounds where they are to riſe to perfection. I be- " gin to plant the drieſt ground in autumn, eighteen months after ſowing, and perſiſt in " this operation until the froſt prevents me. I begin again in February, or rather as the

indeed it is very ſtrange, what is affirmed of that pitchy-rain, reported to have fallen about Cyrene, the year 430 V. C. after which, in a ſhort time, ſprung up a whole wood of the trees of Laſerpitium, producing a precious gum, not much inferior to Benzoin, if at leaſt the ſtory be warrantable. But theſe aërial irradiations, various conceptions, and equivocal productions without ſeed, &c. are difficulties to be ſolved by our philoſophers; alſo whence thoſe leaves of the Platan come, which Dr. Spon tells us, in his Travels, are found floating in ſome of the fountains of the iſles of the Strophades, no ſuch tree growing near them by thirty miles: Tho' theſe may haply be conveyed through ſome unknown ſubterranean paſſage; for were it by the wind, it having a very large leaf, they would be ſeen flying in, or falling out of the air.

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" weather admits, and continue this work ſometimes to the end of April, ſo as to plant " out the product of the two-year old ſeed-beds. I put the plants into the ground " with two cuts of a ſpade, thus ⋗. I raiſe the point of the angle with what we " call a Dibble, and laying the plant up to the neck, ſtamp down the raiſed ſod with the " foot. In this method two men may plant a thouſand in a day. When the ground " is rocky, or very ſtony, I uſe a Dibble ſhod with Iron, having a cleft at the extre- " mity to lead down the root, putting the plants into the ground in the manner that " Cabbages are planted. One man will plant as many in this way as two in the other; " yet the firſt method is preferable where the ground admits of it, as I have always " obſerved fewer plants to fail. My reaſon for planting from the ſeed-bed is, that it " comes neareſt to the operation of Nature. Plants removed from the ſeed-bed into " the nurſery, muſt have their roots pruned conſiderably before they can be planted " into the pits where they are to continue, which adds greatly to the expence. Be- " ſides, *Nurſing* this hardy mountainous tree cauſes a luxuriant growth, which ſpoils " its nature and robs it of longevity.

" It is generally believed that there are two kinds of Fir-trees, the produce of Scot- " land, viz. the red or reſinous large trees, of a fine grain, and hard ſolid wood; " the other, a white-wooded Fir, with a much ſmaller proportion of reſin in it, of a " coarſer grain, and a ſoft ſpungy nature, never comes to ſuch a ſize, and much " more liable to decay. At firſt appearance this would readily denote two di- " ſtinct ſpecies, but I am convinced that all the trees in Scotland, under the deno- " mination of Scotch Fir, are the ſame; and that the difference of the quality of " the wood, and ſize of the trees, is entirely owing to circumſtances, ſuch as the " climate, ſituation, and ſoil they grow in. The fineſt Fir-trees appear in the moſt " mountainous parts of the Highlands of Scotland, in glens or on ſides of hills ge- " nerally lying to a northerly aſpect, and the ſoil of a hard gravelly conſiſtence, " being the natural produce of theſe places; the winged ſeeds are ſcattered in quanti- " ties by the wind, from the cones of the adjacent trees, which expand in April and

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6. In tranſplanting of theſe coniferous trees, which are generally reſinaceous, viz. Fir, Pine, Larix, Cedar, and which have but thin and ſingle roots, you muſt never diminiſh their heads, nor be at all buſy with their roots, which pierce deep, and is all their foundation, unleſs you find any of them bruiſed, or much broken; therefore ſuch downright roots as you may be forced to cut off, it were ſafe to ſear with an hot iron, and prevent the danger of bleeding, to which they are obnoxious even to deſtruction, though unſeen and unheeded. Neither may you diſbranch them, but with great caution, as about March, or before, or elſe in September, and then it is beſt to prune up the ſide-branches cloſe to the trunk, cutting off all that are above a year old; if you ſuffer them too long, they grow too big, and the cicatrice will be more apt to ſpend the

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" May with the heat of the ſun; theſe ſeedlings, when young, riſe extremely cloſe to-
" gether, which makes them grow ſtraight, and free from ſide-branches of any ſize, to
" the height of fifty or ſixty feet before they acquire the diameter of a foot: even in
" this progreſs to height they are very ſlow, occaſioned by the poorneſs of the ſoil, and
" the numbers on a ſmall ſurface, which I may ſay makes them in a conſtant ſtate
" of war for their ſcanty nouriſhment, the ſtronger and talleſt by degrees overtopping
" the weaker, and when the winds blow they laſh againſt one another; this aſſiſts in
" beating off any horizontal branches that might damage the timber with knots, as
" well as by degrees cruſhes the overtopped trees. In ſuch ſtate of hoſtility they con-
" tinue ſtruggling until the maſter-trees acquire ſome ſpace around them; then they
" begin to ſhoot out in a more buſhy manner at the top, gradually loſing their ſpiral
" form, increaſing afterwards more in ſize of body than height, ſome acquiring four
" feet diameter, and about ſixty feet of height to the branches, fit for the fineſt deal
" board. The growth is ſtill extremely ſlow, as it plainly proved by the ſmallneſs of
" the grain of the wood, which appears diſtinctly in circles from the center to the bark.
" Upon cutting a tree over cloſe at the root, I can venture to point out the exact
" age, which, in theſe old Firs, comes to an amazing number of years. I lately pitch-
" ed upon a tree of two feet and a half diameter, which is near the ſize of a planted
" Fir of fifty years of age, and I counted exactly two hundred and fourteen cir-
" cles or coats, which makes this natural Fir above four times the age of the plant-
" ed one. Now as to planted Firs, theſe are raiſed firſt in dreſſed ground from the
" ſeed, where they ſtand two ſeaſons or more, then are planted out in the ground they
" are to continue in at regular diſtances, have a clear circumference round them for
" extending both roots and branches; the one gives too quick nouriſhment to the
" tree which ſhoots out in luxuriant growth, and the other allows many of the
" branches to ſpread horizontally, ſpoiling the timber with knots; beſides, this quick
" growth occaſions theſe thick yearly circular coats of wood, which form a coarſe
" grain of a ſpungy ſoft nature. The juices never after ripen into a proportional

tree in gum; upon which accident, I adviſe you to rub over their wounds with a mixture of cow-dung; the neglect of this coſt me dear, ſo apt are they to ſpend their gum. Indeed, the Fir and Pine ſeldom out-live their being lopped. Some adviſe us to break the ſhells of Pines, to facilitate their delivery, and I have eſſayed, but to my loſs; nature does obſtetricate and do that office of herſelf, when it is the proper ſeaſon; neither does this preparation at all prevent thoſe which are ſo buried, whilſt their hard integuments protect them both from rotting, and the vermin. CHAP. I.

Pinaſtes, the domeſtic Pine, grows very well with us, both in mountains and plains. But the Pinaſter, or wilder, of which are four ſorts, beſt for walks: *pulcherrima in hortis*, as already we have ſaid, becauſe it grows tall and proud, maintaining its branches at the ſides, which the other Pine does leſs frequently. There is in New-England a very broad Pine, which increaſes to a wonderful bulk and magnitude, inſomuch that large canoes have been excavated out of the body of it, without any PINASTER.

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" quantity their reſinous preſervative balm; ſo that the plantations decay before the " wood acquires age, or a valuable ſize; and the timber, when uſed in work, has nei- " ther ſtrength, beauty, nor duration. I believe the climate has likewiſe a great ſhare " in forming the nature of the beſt wood, which I account for in the following man- " ner: The moſt mountainous parts of the Highlands, particularly the northerly " hanging ſituations, where theſe fine Fir-trees are, have a much ſhorter time of " vegetation than a more ſoutherly expoſure, or the lower open counties, being ſhaded " by high hills from the rays of the ſun, even at mid-day, for months together; ſo " that, with regard to other vegetables, nature viſibly continues longer in a torpid " ſtate there than in other places of the ſame latitude. This dead ſtate of nature for " ſo long a time yearly, appears to me neceſſary to form the ſtrength and health of " this particular ſpecies of timber. No doubt they may at firſt ſhow a gratefulneſs " for better ſoil and more ſun, by ſhooting out ſpontaneouſly; but if the plant or tree " is ſo altered by this luxury, that it cannot attain any degree of perfection fit for the " purpoſes intended, the attempt certainly proves in vain.

" From what is ſaid above, it is not at all my intention to diſſuade from *planting* " Scotch Fir, but to encourage thoſe that have the proper ſoil and ſituation to do ſo; " being of opinion that where theſe circumſtances agree, and there, planting not in " lines, but irregularly and thicker than common, the trees will come to be of equal " ſize and value with the *natural* ones. In confidence of this, I have planted ſeveral " millions on the ſides of hills, out of the reach of ſeed from the natural Firs.

" As to the Larch, it grows in this country, in great abundance, from the ſeed of " our own plantations. I have found this beautiful and hardy tree to anſwer extremely " well when planted out, on barren grounds, from ſix inches to ſix feet high; and

Book II. addition. But beſides theſe large and gigantic Pines, there is the Spiner, with ſharp thick briſtles, yielding a roſin or liquor odorous, and uſeful in carpentry work.

8. The Fir grows talleſt, being planted reaſonably cloſe together, but ſuffers nothing to thrive under it. The Pine not ſo inhoſpitable; for, by Pliny's good leave, it may be ſown with any tree, all things growing well under its ſhade, and excellent in woods: Hence Claudian,

Et comitem quercum Pinus amica trahit.

The friendl . . . the mighty Oak invites.

9. They both affect the cold, high and rocky grounds, *Abies in montibus altis.* Thoſe yet which grow on the more ſouthern and leſs-expoſed quarters, a little viſited with the beams of the ſun, are found to thrive beyond the other, and to afford better timber; and this was obſerved long ſince by Vitruvius of the Infernates, as he calls them, in compariſon with the Supernates, which, growing on the northern and ſhady ſide of the Appenines, were nothing ſo good, which he imputes to the want of due digeſtion. They thrive, as we ſaid, in the moſt ſterile places, yet

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" they are ſeldom known to fail, except where water has reached their roots. I have " often remarked, with ſurprize, that when Cattle or Deer have broken off the main " ſhoots with their horns, another branch has taken the lead, and ſtretched away at " ſuch a rate as to heal up the wound ſo compleatly, that in a few years it was with " difficulty I could diſcover the traces of the injury. The amazing growth of the " Larix far exceeds with me all the native as well as foreign trees, bearing the expo- " ſure and inclemency of the ſeaſon better than any of them; and of late I have the " pleaſure to find that they naturalize themſelves by ſowing. I wiſh my experience " could aſſiſt me in ſpeaking with as much certainty with regard to the value and uſe- " fulneſs of the timber; but in that I can give but little ſatisfaction, as my oldeſt " trees are not thirty years from the ſeed. At Dunkeld I have ſeen a ſmall ſummer- " houſe finiſhed with Larix wood; the plants came from London in earthen pots, " about the year 1740, rather as a curioſity than from any expectation of their excel- " lency. Though full of circular knots, the wood looked well, and did not ſeem to " gall or warp ſo much as Fir of the ſame age and ſeaſoning would have done. It " will be neceſſary to remark, that the heart or center of large trees is generally the " knotticſt part of the trunk, occaſioned by the collateral branches, when young, ſup- " porting the ſtem to ſtature, which, as the tree advances, die and fall off; and this is

will grow in better, but not in over-rich and pinguid. The worſt land in Wales bears, as I am told, large Pine; and the Fir, according to his aſpiring nature, loves alſo the mountain more than the valley; but ἐν τοῖς παλισκίοις ὄλως ἐ φύεται, it cannot endure the ſhade, as Theophraſtus obſerves, de Plin. lib. iv. cap. i. But this is not rigidly true, for they will grow in conſort, till they even ſhade and darken one another; and will alſo deſcend from the hills, and ſucceed very well, being deſirous of plentiful waterings, till they arrive to ſome competent ſtature; and therefore they do not proſper ſo well in an over ſandy and hungry ſoil or gravel, as in the very entrails of the rocks, which afford more drink

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"particularly evident in trees that grow in thickets. The ſurface ſoon heals over, "and the body of the tree is annually increaſed by circular rings of wood. I ſhall "ſuppoſe a tree to be a foot in diameter when the lower branches die and drop off. "In courſe of time it acquires four feet in diameter, which gives a ſurrounding coat, "one foot and a half in thickneſs, of clean timber, the center remaining knotty. The "growth of the Larix, and manner of dropping its branches when cloſe together, very "much reſembles the Fir; ſo I am confident this fault of knottineſs, which ſeems to "be the principal one, will amend by age. Yours, &c."

It would appear from the hardy nature of the Fir, and the readineſs with which it grows in almoſt every part of this iſland, that it was an indigenous tree; yet Cæſar expreſsly ſays that it is not a native. In his deſcription of the country, he obſerves, that Britain had all the trees of Gaul, except the Beech and Fir: *Materia cujuſque generis, ut in Galliâ, præter Fagum et Abietem.* As all the Britiſh words for the Beech are clearly of Roman derivation, Faighe, Faghe, or Faydh, it is probable that it was introduced into Britain with the Roman colonies; but with regard to the Fir, the caſe is otherwiſe, for many of its names are purely Britiſh; and this I eſteem a teſtimony not to be overthrown. The ingenious Mr. Whitaker, in the firſt volume of his Hiſtory of Manchester, p. 309, treats this ſubject with great learning and preciſion; he ſays: "Among the many Roman names for "the Fir in the Britiſh language, there are three which are purely and abſolutely "Britiſh. The Scotch diſtinguiſh the Fir by the Britiſh appellation of Gius; the "Iriſh, by the Britiſh appellation of Giumhus; and the Welch, by the Britiſh appel-"lation of Fynnidaydh. Had the Fir been originally introduced into the fields of "Britain by the Romans, all the Britiſh appropriated appellations of it muſt have "been, as ſome of them evidently are, the mere derivatives of the Roman Abies, "Z-aban, S-ibuydh, S-apin, and S-abin. And the exiſtence of one Britiſh appropri-"ated appellation for the Fir is a ſtrong argument in itſelf that the tree was not in-"troduced by the Romans, but that it was originally Britiſh.

"Firs actually appear as early as the third century in the unromanized regions of Ca-"ledonia and Ireland, and appear as the acknowledged Aborigines of the country. Firs

Book II. to the roots that penetrate into their meanders and winding receſſes. But though they require this refreſhing at firſt, yet do they perfectly abhor all ſtercoration; nor will they much endure to have the earth opened about their roots for ablaqueation, or be diſturbed: This is alſo to be underſtood of Cypreſs. A Fir, for the firſt half-dozen years, ſeems to ſtand, or at leaſt make no conſiderable advance, but it is when thoroughly rooted, that it comes away miraculouſly. That honourable and learned Knight, Sir Norton Knatchbull, whoſe delicious plantation of Pines and Firs I beheld with great ſatisfaction, has aſſured me, that a Fir-tree of his raiſing did ſhoot no leſs than ſixty feet in height in little

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" are frequently mentioned in the poems of the Caledonian bard, not as plants ſeen by " him on the continent or in the provinces, not merely as forming the equivocal " imagery of a ſimilitude, but as actually and antiently growing in both. The ſpear " of a warrior, ſays an Iriſhman in Ulſter, pointing to a neighbouring tree, *is like that* " *blaſted Fir:* And it is compared by another to the Fir of Slimora particularly, a " mountain in the north of Ireland. And the tomb of a fallen warrior, upon the " weſtern ſhore of Caledonia, is thus deſcribed from the reality by the bard: *Doſt* " *thou not behold, Malvina, a rock with its head of heath? Three aged Firs bend from* " *its face; green is the narrow plain at its feet.*

" The Fir is alſo diſcovered in our Mancunian moſſes together with the Birch and " the Oak, as frequent as the Oak, and much more frequent than the Birch. The " Fir of our moſſes is not, as the wild hypotheſis of ſome aſſerts it to be, a mere " mimickry of the natural Fir, merely an Oak or a Birch that, lying for ages in the " unctuous maſs, has diſcharged itſelf of all its original properties, and has adopted " all the characteriſtic properties of the Fir. Had this been the caſe, it could not " poſſibly be diſtinguiſhed from the Oak or the Birch, and all the trees of our " moſſes muſt have been equally and abſolutely Firs. The Fir is the only tree of our " moſſes that exhibits a reſinous quality. And the Fir of our moſſes is as much diſ- " criminated to the eye, by the peculiar nature of its grain, as the Oak or the Birch: " Nor is this all: The Fir is perpetually diſcovered in ſuch of our moſſes particularly " as were demonſtrably prior to the ſettlement of the Romans among us. It is diſ- " covered in ſuch moſſes as appear to the preſent period actually traverſed by the roads " of the Romans. It is diſcovered immediately adjoining to the road, and abſolutely " on both ſides of it. Thus is the Fir found very frequent in the moſs of Failſworth, " cloſe to either margin of the ſtreet, and mingled with Oaks and Birches. And as " the road demonſtrates the moſs to have been formed before the ſettlement of the " Romans at Mancheſter, ſo the trees diſcovered in the moſs muſt have been all " equally cotemporary with it, and all equally with it prior to the ſettlement of the " Romans at Mancheſter. This argument carries a deciſive authority with it: But " we can proſecute it fairly up to demonſtration: The Fir has been diſcovered in our

more than twenty years. The ſame ſpeedy growth may be obſerved in the trees belonging to Sir Peter Wentworth at Lillingſton-Lovel; Cornbury in Oxfordſhire; and other places; but eſpecially thoſe in Harefield park, in the county of Middleſex, belonging to Mr. Serjeant Nudigate, where there are two Spaniſh or Silver Firs, that, being planted there anno 1603, at two years growth from the ſeed, are now (1679) become goodly maſts: The biggeſt of them, from the ground to the upper bough, is eighty-one feet, though forked on the top, which has not a little impeded its growth: The girt or circumference below is thirteen feet, and the length, ſo far as is timber, that is, to ſix inches ſquare, ſeventy-three feet; in the middle, ſeventeen inches ſquare, amounting by calculation to one hundred and

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" moſſes, not only in ſuch parts as are immediately contiguous to the Roman roads " over them, but in ſuch as are actually occupied and covered with the line of the " Roman roads, and in the black ſpungy earth immediately beneath the Roman gravel. " It has been very recently dug up by myſelf under the roots of the road over Failſ- " worth Moſs. And I have now in my own poſſeſſion two pieces of tried genuine " Fir that were bedded with the remains of a Birch-tree one yard and a half in the " moſſy ſoil, and three yards under the crown of the Roman gravel.

" Theſe are three arguments which are all ſufficiently convincing of themſelves. " Theſe are three arguments which, ſpringing from as many different ſources, all " happily unite together in one common channel, and form together an irreſiſtible " tide of evidence. And a fact which relates to the remoteſt antiquity, and which " is aſſerted againſt the higheſt hiſtorical authority, cannot be too powerfully demon- " ſtrated. The Fir then was one of the trees of Britain before the arrival of the Ro- " mans among us."

The Pine was ſacred to Cybele, who turned her beloved Attis into that tree.

Et ſuccincta comas, hirſutaque vertice Pinus;
Grata Deum matri. Siquidem Cybeleiüs Attis
Exuit hac hominem, truncoque induruit illo. OVID. MET.

It was a cuſtom among the antients, when they gave over any employment, to devote their inſtruments, and hang them up in ſome ſacred place. Virgil alludes to this cuſtom when he makes Corydon ſay,

Hic arguta ſacra pendebit fiſtula Pinu. ECL. viii.

Pendebatque vagi paſtoris in arbore votum
Garrula ſylveſtri fiſtula ſacra Deo. PROPERT.

Some years ago a ſtone was diſcovered in *Provence*, in *France*, on which was figured a Pine-tree with all the ſymbols of Cybele and Attis. Two tympanums hang on the branches of the tree on one ſide, and on the other a *paſtoral pipe*, agreeable to antient cuſtom. MONTFAUCON. vol. I.

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forty-ſix feet of good timber. The other tree is indeed not altogether ſo large, by reaſon of its ſtanding near the houſe when it was burnt, about forty years ſince, when one ſide of the tree was ſcorched alſo; yet it has not only recovered that ſcar, but thrives exceedingly, and is within eight or nine feet as tall as the other, and would probably have been the better of the two, had not that impediment happened, it growing ſo taper and erect, as nothing can be more beautiful. This, I think, if we had no other, is a pregnant inſtance, as of the ſpeedy growing of that material, ſo of all the encouragement I have already given for the more frequent cultivating this ornamental, uſeful, and profitable tree, abounding, doubtleſs, formerly in this country of ours, if what a grave and authentic author writes be true, Athenæus relating, that the ſtupendious veſſel, built ſo many ages ſince by Hiero, had its maſt out of Britain. Take notice, that none of theſe mountainous trees ſhould be planted deep, but as ſhallow as may be, for their competent ſupport.

Picea.

10. The Picea, already deſcribed, grows on the Alps among the Pine, but neither ſo tall nor ſo upright, but bends its branches a little, which have the leaf quite about them, ſhort and thick, not ſo flat as the Fir. The cones grow at the point of the branches, and are much longer than moſt other cones, containing a ſmall darkiſh ſeed. This tree produces a gum almoſt as white and firm as frankincenſe: But it is the Larix (another ſort of Pine) that yields the true Venetian turpentine, of which hereafter.

11. There is alſo the Piceaſter, already mentioned, a wilder ſort, the leaves ſtiff and narrow-pointed, and not ſo cloſe, out of which the greateſt ſtore of pitch is boiled. The Tæda likewiſe, which is, as ſome think, another ſort abounding in Dalmatia, more unctuous, and more patient of the warmer ſituations, and ſo inflammable, that it will ſlit into candles; and therefore ſome will by no means admit it to be of a different ſpecies, but a metamorphoſis of over-grown fattineſs, to which the moſt judicious incline. But of theſe, the grand Canaries, and all about the mountains near Teneriff, are full, where the inhabitants do uſually build their houſes with the timber of the Pitch-tree. They cut it alſo into wainſcot, in which it ſucceeds marvelloufly well; abating that it is ſo obnoxious to firing, that whenever a houſe is attacked they make all imaginable haſte out of the conflagration, and almoſt deſpair of extinguiſhing it. They there alſo uſe it for candle-wood, and to travel in the night by the light of it, as we do by links and torches. Nor do they make theſe Tëas, as the Spa-

niards call them, of the wood of Pine alone, but of other trees, as of Oak and Hafel, which they cleave and hack, and then dry in the fyen or chimney, but have certainly ſome unctuous and inflammable matter in which they afterwards dip it: But thus they do in Biſcay, as I am credibly informed.

12. The bodies of theſe being cut, or burnt down to the ground, will emit frequent ſuckers from the roots; but ſo will neither the Pine nor Fir, nor indeed care to be topped. But the Fir may be propagated of layers and cuttings, which I divulge as a conſiderable ſecret that has been eſſayed with ſucceſs.

13. That all theſe, eſpecially the Fir and Pine, will proſper well with us, is more than probable; becauſe it is a kind of demonſtration, that they did heretofore grow plentifully in Cumberland, Cheſhire, Staffordſhire, and Lancaſhire, if the multitudes of theſe trees to this day found entire, and buried under the earth, though ſuppoſed to have been overthrown, and covered ſo over ſince the univerſal deluge, be indeed of this ſpecies. Dr. Plot ſpeaks of a Fir-tree in Staffordſhire of one hundred and fifty feet high, which ſome think of ſpontaneous growth, beſides ſeveral more ſo irregularly ſtanding, as ſhews them to be natives. But to put this at laſt out of controverſy, ſee the extract of Mr. de la Prim's letter to the Royal Society, Tranſactions, number 277, and the old map of Crout, and of the yet, or lately remaining Firs growing about Hatfield in the commons, flouriſhing from the ſhrubs and ſtubs of thoſe trees, to which I refer the reader. As for buried trees of this ſort, the late Dr. Merrett, in his Pinax, mentions ſeveral places of this nation where ſubterraneous trees are found; as, namely, in Cornwal, *ad finem terræ*, *in agris Flints*; in Pembrokeſhire, towards the ſhore, where they ſo abound, *ut totum littus* (ſays the Doctor) *tanquam ſilva cædua apparet*; in Cheſhire, alſo (as we ſaid) Cumberland and Angleſey, and ſeveral of our Euro-boreal tracts, and are called Noah's ark. By Chatneſſe in Lancaſhire, ſays Cambden, the low moſſy ground was no very long time ſince carried away by an impetuous flood, and in that place now lies a low irriguous vale, where many proſtrate trees have been digged out. And from another I receive, that, in the moors of Somerſetſhire, towards Bridgewater, ſome lengths of paſture growing much withered, and parched more than other places of the ſame ground, in a great drought, it was obſerved to bear the length and ſhape, in groſs, of trees; they digged, and found in the ſpot Oaks

SUBTERRANEAN TREES.

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as black as Ebony, and have been from hence inſtructed to take up many hundreds of the ſame kind. In a fenny tract of the iſles of Axholme, lying part in Lincolnſhire, and part in Yorkſhire, have been found Oaks five yards in compaſs, and fifteen in length, ſome of them erect, and ſtanding as they grew, in firm earth below the moors, with abundance of Fir, which lie more ſtooping than the Oak, ſome being thirty-ſix yards long beſides the tops. And ſo great is the ſtore of theſe ſubterraneans, as the inhabitants have for divers years carried away above two thouſand cart-loads yearly: See Dugdale's Hiſtory of Draining. This might be of good uſe for the like detections in Eſſex, Lincolnſhire, and places either low ſituate, or adjacent to the ſea; alſo at Binfield-heath in Kent, &c. Theſe trees were (ſome think) carried away, in times paſt, by ſome accident of inundation, or by waters undermining the ground, till their own weight and the winds bowed them down, and overwhelmed them in the mud: For it is obſerved, that theſe trees are no where found ſo frequently as in boggy places. But that the burning of theſe trees ſo very bright, ſhould be an argument that they were Fir, is not neceſſary, ſince the bituminous quality of ſuch earth may be imparted to them. And Cambden denies them to be Fir trees, ſuggeſting the query, Whether there may not poſſibly grow trees even under the ground as well as other things? Theophraſtus, indeed, lib. iv. cap. viii. ſpeaks of whole woods, Bays and Olives, bearing fruit; and that of ſome Oaks bearing acorns, and thoſe even under the ſea, which was ſo full of plants and other trees, as, it is ſaid, Alexander's forces, ſailing to the Indies, were much hindered by them. There are in Cumberland, on the ſea-ſhore, trees ſometimes diſcovered at low-water, and at other times, that lie buried in the ſand; and in other moſſy places of that county it is reported the people frequently dig up the bodies of vaſt trees without boughs, and that by direction of the dew alone in ſummer, for they obſerve it never lies upon that part under which thoſe trees are interred. Theſe particulars I find noted by the ingenious author of the Britannia Baconica. How vaſt a foreſt, and what goodly trees were once ſtanding in Holland, and thoſe low countries, till about the year 860, when an hurricane obſtructing the mouth of the Rhine, near Catwic, made that horrid devaſtation good authors mention. And they do this day find monſtrous bodies and branches (nay, with the very nuts, moſt entire) of proſtrate and buried trees, in the Veene, eſpecially towards the ſouth, and at the bottom of the waters: Alſo near Bruges, in Flanders, whole woods have been found twenty ells deep, in which the trunks, boughs,

and leaves do ſo exactly appear, as to diſtinguiſh their ſeveral ſpecies, with the ſeries of their leaves yearly falling: Of which ſee Boetius de Boot.

Dr. Plot, in his Nat. Hiſt. of Oxfordſhire and Staffordſhire, mentions divers ſubterraneous Oaks, black as Ebony, and of mineral ſubſtance for hardneſs, quite through the whole ſubſtance of the timber, cauſed, as he ſuppoſes, and learnedly evinces, by a vitriolic humour of the earth, of affinity to the nature of the ink-galls which that kind of tree produces. Of theſe he ſpeaks of ſome found ſunk under the ground, in an upright and growing poſture, to the perpendicular depth of ſixty feet; of which one was three feet diameter, of an hardneſs emulating the politeſt Ebony: But theſe trees had none of them their roots, but were found plainly to have been cut off by the kerf. There were great ſtore of Haſel-nuts, whoſe ſhells were as ſound as ever, but no kernel within. It is there the inquiſitive author gives you his conjecture how theſe deep interments happened; namely, by our anceſtors, many ages ſince, clearing the ground for tillage, and, when wood was not worth converting to other uſes, digging trenches by the ſides of many trees, in which they buried ſome, and others they flung into quagmires and lakes to make room for more profitable agriculture. In the mean time, concerning this moſſy wood, as they uſually term it, becauſe, for the moſt part, dug up in moſſy and moory bogs where they cut for turf, it is highly probable, with the learned Mr. Ray, that theſe places were, many ages ſince, part of firm land covered with wood, afterwards undermined and overwhelmed by the violence of the ſea, and ſo continuing ſubmerged till the rivers brought down earth and mud enough to cover the trees, filling up the ſhallows, and reſtoring them to terra firma again, which he illuſtrates from the like accident upon the coaſt of Suffolk, about Dunwich, where the ſea does at this day, and hath for many years paſt much incroached upon the land, undermining and ſubverting by degrees a great deal of high ground, ſo as by antient writings it appears a whole wood of more than a mile and a half, at preſent is ſo far within the ſea. Now if, in ſucceeding ages, as it is probable enough, the ſea ſhall by degrees be filled up, either by its own working, or by earth brought down by land-floods, ſtill ſubſiding to the bottom, and ſurmounting the tops of theſe trees, and ſo the ſpace added again to the firm land, the men that ſhall then live in thoſe parts will, it is likely, dig up theſe trees, and as much wonder how they came there, as we do at preſent thoſe we have been ſpeaking of.

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In the mean time, to put an end to the various conjectures concerning the cauſes of ſo many trees being found ſubmerged, for the moſt paſt attributed to the deſtruction made by the Noahtic inundation; after all has been ſaid of what was found in the level of Hatfield, drained at the never-to-be-forgotten charge and induſtry of Sir Cornelius Vermuiden, I think there will need no more enquiry. For there were diſcovered trees, not only of Fir and Pitch, but of very goodly Oaks, even to the length of one hundred feet, which were ſold at fifteen pounds the tree, black and hard as Ebony; all their roots remaining in the ſoil, and their natural poſture, with their bodies proſtrate by them, pointing for the moſt part north-eaſt: And of ſuch there ſeemed to be millions of all the uſual ſpecies natural to this country, ſound and firm, Aſh only excepted, which were become ſo rotten and ſoft, as to be frequently cut through with the ſpade only; whereas Willows, and other tender woods, continued very ſound and entire. Many of theſe ſubterranean trees, of all ſorts, were found to have been cut and burnt down, ſquared and converted for ſeveral uſes, into boards, pales, ſtakes, piles, bars, &c. Some trees half riven, with the wedges ſticking in them; broken ax-heads in ſhape of ſacrificing inſtruments, and frequently ſeveral coins of the Emperor Veſpaſian, &c. There was, among others, one prodigious Oak of one hundred and twenty feet in length, and twelve in diameter, ten feet in the middle, and ſix at the ſmall end; ſo as, by computation, this monſter muſt have been a great deal longer; and for this tree was offered twenty pounds. The truth and hiſtory of all this is ſo perfectly deſcribed by Allan. de la Pryme, inſerted among the tranſactions of the Royal Society, that there needs no more to be ſaid of it to evince that, not only here, but in other places where ſuch trees are found in the like circumſtances, it has been the work and effects of vaſt armies of the Romans, when finding they could not with all their force ſubdue the barbarous inhabitants, by reaſon of their continual iſſuing out of thoſe intricate fortreſſes and impediments, they cauſed whole foreſts to be cut down by their legions and ſoldiers, whom they never ſuffered to remain idle during their winter-quarters, but were continually exerciſed in ſuch public and uſeful works as required a multitude of hands; by which diſcipline they became hardy, active, and leſs at leiſure to mutiny, or corrupt one another. I do not affirm that this anſwers all ſubmerged trees, but of very many imputed to other cauſes.

But we ſhall enquire farther concerning theſe ſubterranean productions anon, and whether the earth, as well as the water, have not the virtue of ſtrange tranſmutations. Theſe trees are found in moors by poking with ſtaves of three or four feet long ſhod with iron.

13. In Scotland many ſubmerged Oaks are found near the river Neſs, and, as we noted, there is a moſt beautiful ſort of Fir or rather Pine, bearing ſmall ſharp cones, (ſome think it the Spaniſh Pinaſter) growing upon the mountains; of which, from the late Marquis of Argyle, I had ſome ſeeds ſent me, which I have ſown with tolerable ſucceſs; and I prefer them before any other, becauſe they grow both very erect, and, fixing themſelves ſtoutly, need little or no ſupport. Near Lochbroom, betwixt the loch and an hill, they grow in ſuch quantity, that, from the ſpontaneous fall, ruin and decay of the trees lying croſs one another to a man's height, partly covered with moſs, and partly earth and graſs, which rots, fills up, and grows again, a conſiderable hill has, in proceſs of time, been raiſed to almoſt their very tops, which, being an accident of ſingular remark, I thought fit to mention. Both Fir and Pine (ſociable trees) planted pretty near together, ſhred and clipt at proper ſeaſons, make ſtately, noble, and very beautiful ſkreens and fences to protect Orange, Myrtle, and other curious greens, from the ſcorching of the ſun and ruffling winds, preferable to walls. See how to be planted and cultivated, with the dimenſions of a ſkreen, in the rules for the defence of gardens, annexed to De la Quintin, N°. XV. by Mr. London and Mr. Wiſe. In the mean time, none of theſe ſorts are to be mingled in taller woods or copſes, in which they ſtarve one another, and loſe their beauty. And now thoſe who would ſee what Scotland produces, (of innumerable trees of this kind) ſhould conſult the learned Sir Robert Sibbald.

14. For the many and almoſt univerſal uſe of theſe trees both ſea and land will plead,

——————dant utile lignum
Navigiis Pinos—————— GEORG. ii.

The uſeful Pine for ſhips——

Hence Papinius VI. Thebaid. calls it *Audax Abies*. They make our beſt maſt, ſheathing, ſcaffold poles, &c. heretofore the whole veſſel. It is pretty, ſaith Pliny, to conſider that thoſe trees, which are ſo much ſought after for ſhip-

BOOK II. ping, ſhould moſt delight in the higheſt of mountains, as if they fled from the ſea on purpoſe, and were afraid to deſcend into the waters. With Fir we likewiſe make all inteſtine works, as wainſcot, floors, pales, balks, laths, boxes, bellies for all muſical inſtruments in general, nay, the ribs and ſides of that enormous ſtratagem, the ſo famous Trojan Horſe *, may be thought to be built of this material; and, if the Poet miſtake not,

* Macrob. Sat. vi. cap. ult.

——————Sectaque intexunt Abiete coſtas. ÆN. II.

——————The ribs with deal they fit.

There being no material more obedient and ready to bend for ſuch works.

In Holland they receive their beſt maſts out of Norway, and even as far as Muſcovy, which are beſt eſteemed, as conſiſting of long fibres without knots, but deal boards from the firſt; and though Fir rots quickly in ſalt water, it does not ſo ſoon periſh in freſh; nor do they yet refuſe it in merchant-ſhips, eſpecially the upper parts of them, becauſe of its lightneſs. The true Pine was ever highly commended by the antients for naval architecture, as not ſo eaſily decaying; and we read that Trajan cauſed veſſels to be built both of the true and ſpurious kind, well pitched, and overlaid with lead, which perhaps might hint our modern ſheathing with that metal at preſent. Fir is exceeding ſmooth to poliſh on, and therefore does well under gilding work, and takes black equal with the Pear-tree. Both Fir, and eſpecially Pine, ſucceed well in carving, as for capitals, feſtoons, nay ſtatues, eſpecially being gilded, becauſe of the eaſineſs of the grain to work, and take the tool every way; and he that ſhall examine it nearly will find that famous image of the bleſſed Virgin at Loretto (reported to be carved by the hands of St. Luke) to be made of Fir, as the grain eaſily diſcovers it. The Torulus, as Vitruvius terms it, and heart of deal, kept dry, rejecting the albumen and white, is everlaſting; nor does there any wood ſo well agree with the glew as it, or is ſo eaſy to be wrought. It is alſo excellent for beams, and other timber-work in houſes, being both light and exceedingly ſtrong, and therefore of very good uſe for bars and bolts of doors, as well as for doors themſelves, and for the beams of coaches; a board of an inch and half thick will carry the body of a coach with great eaſe, by reaſon of a natural ſpring which it has, not eaſily violated. You ſhall find that of old they uſed it for carts and other carriages, alſo for piles to ſuperſtruct on in boggy grounds. Moſt of Venice and

Amſterdam is built upon them, with ſo exceſſive charge, that the foundations of their houſes, as ſome report, coſt as much as what is erected on them, there being driven in no fewer than thirteen thouſand ſix hundred and fifty-nine great maſts of this timber under the new Stadt-houſe of Amſterdam. For ſcaffolding alſo there is none comparable to it; and I am ſure we find it an extraordinary ſaver of Oak, where it may be had at a reaſonable price. I will not complain what an incredible maſs of ready money is yearly exported into the northern countries for this ſole commodity, which might all be ſaved were we induſtrious at home, or could have it out of Virginia, there being no country in the whole world ſtored with better; beſides another ſort of wood, which they call Cypreſs, much exceeding either Fir or Pine for this purpoſe, being as tough and ſpringy as Yew, and bending to admiration; it is alſo lighter than either, and everlaſting in wet or dry; ſo as I much wonder that we enquire no more after it. In a word, not only here and there an houſe, but whole towns and great cities are and have been built of Fir only; nor that alone in the north, as Moſcow, &c. where the very ſtreets are paved with it, (the bodies of the trees lying proſtrate one by one in manner of a raft) but the renowned city of Conſtantinople; and, nearer home, Thoulouſe in France was, within little more than an hundred years, moſt of Fir, which is now wholly marble and brick, after eight hundred houſes had been burnt, as it often happens at Conſtantinople——a place where no accident even of this devouring nature will at all move them to re-edify with more laſting materials. To conclude with the uſes of Fir, we have moſt of our pot-aſhes of this wood, together with the torch, or funebral ſtaves; nay, and of old, ſpears of it, if we may credit Virgil's Amazonian Combat.

——————————— Cujus apertum
Adverſi longâ tranſverberat abiete pectus. ÆN. xi.

——————————————————— She preſt
A long Fir ſpear through his expoſed breaſt.

Laſtly, The very chips or ſhavings of deal boards are of other uſe than to kindle fires alone. Thomas Bartholinus, in his *Medicina Danorum*, Diſſert. vii. where he diſclaims the uſe of hops in beer as pernicious and malignant, and from ſeveral inſtances how apt it is to produce and uſher in infections, nay plagues, &c. would ſubſtitute in its place the ſhavings of deal boards, as he affirms, to give a grateful odour to the drink;

Book II. and how ſovereign thoſe reſinous woods, the tops of Fir and Pines, are againſt the ſcorbut, gravel in the kidneys, &c. we generally find. It is in the ſame chapter that he commends alſo Wormwood, Marrubium, Chamælæagnum, Sage, Tamariſk, and almoſt any thing rather than hops. The bark of the Pine heals ulcers; and the inner rind cut ſmall, contuſed, and boiled in ſtore of water, is an excellent remedy for burns and ſcalds, waſhing the ſore with the decoction, and applying the ſoftened bark. It is alſo ſovereign againſt frozen and benumbed limbs. The diſtilled water of the green cones takes away the wrinkles of the face; dipping cloths therein, and laying them on it, becomes a coſmetic not to be deſpiſed. The Pine, or Picea, buried in the earth, never decays. From the latter tranſudes a very bright and pellucid gum; hence we have likewiſe roſin. Alſo of the Pine are made boxes and barrels for dry goods; yea, and it is cloven into (ſcandulæ) ſhingles for the covering of houſes in ſome places; alſo hoops for wine veſſels, eſpecially of the eaſily flexible wild Pine; not to forget the kernels, (this tree being always furniſhed with cones, ſome ripe, others green) of ſuch admirable uſe in emulſions; and for tooth-pickers, even the very leaves are commended. In ſum, they are plantations which exceedingly improve the air by their odoriferous and balſamical emiſſions, and for ornament create a perpetual ſpring where they are plentifully propagated. And if it could be proved that the Almug-trees*, recorded 1 Reg. x. 12, (whereof pillars for that famous temple and the royal palace, harps and pſalteries, &c. were made) were of this ſort of wood, as ſome doubt not to aſſert, we ſhould eſteem it at another rate; yet we know Joſephus affirms they were a kind of Pine-tree, though ſomewhat reſembling the Fig-tree wood to appearance, as of a moſt luſtrous candor. In 2 Chron. ii. 8, there is mention of Almug-trees growing in Lebanon; and if ſo, methinks it ſhould rather be, as Buxtorf thinks, a kind of Cedar, (yet we find Fir alſo in the ſame period) for we have ſeen a whiter ſort of it, even very white as well as red; though ſome affirm it to be but the ſap of it, as our cabinet-makers call it: I ſay there were both Fir and Pine-trees growing upon thoſe mountains; and the learned Meibomius, in that curious treatiſe of his, *De Fabrica Triremium*, ſhews that there were ſuch trees brought out of India, or Ophir. In the mean time, Mr. Purchas informs us that Dr. Dee writ a laborious treatiſe almoſt wholly on this ſubject, but I could never have the good hap to ſee it, wherein, as Commiſſioner for Solomon's timber, and like a learned Architect and Planter, he has ſummoned a jury of twelve ſorts of trees; namely, 1. the Fir; 2. Box; 3. Cedar; 4. Cypreſs; 5. Ebony; 6. Aſh; 7. Juni-

* Where the LXX (viz. 3 Kings x. 12) calls it ἀπελέκητα *non dedolata*; others *ligna undulata*.

per; 8. Larch; 9. Olive; 10. Pine; 11. Oak; 12. Sandal-trees, to examine which of them were this Almugim, and at laſt ſeems to concur with Joſephus in favour of Pine or Fir; who poſſibly, from ſome antient record, or fragment of the wood itſelf, might learn ſomething of it; and it is believed that it was ſome material both odoriferous to the ſcent, and beautiful to the eye, and of fitteſt temper to refract ſounds, beſides its ſerviceableneſs for building; all which properties are in the beſt ſort of Pine, or Thyina, as Pliny calls it; or perhaps ſome other rare wood, of which the Eaſtern Indies are doubtleſs the beſt provided; and yet I find that thoſe vaſt beams which ſuſtained the roof of St. Peter's church at Rome, laid, as reported, by Conſtantine the Great, were made of the Pitch-tree, and have laſted from anno 336, down to our days, above one thouſand three hundred years.

15. But now whilſt I am reciting the uſes of theſe beneficial trees, Mr. Winthorp preſents the Royal Society with the proceſs of making tar and pitch in New-England, which we thus abbreviate. Tar is made out of that ſort of Pine-tree from which naturally turpentine extilleth; and which, at its firſt flowing out, is liquid and clear; but, being hardened by the air, either on the tree, or wherever it falls, is not much unlike the Burgundy pitch; and we call them Pitch-pines out of which this gummy ſubſtance tranſudes. They grow upon the moſt barren plains, on rocks alſo, and hills riſing amongſt thoſe plains, where ſeveral are found blown down, and have lain ſo many ages, as that the whole bodies, branches, and roots of the trees being periſhed, ſome certain knots only of the boughs have been left remaining entire, (theſe knots are that part where the bough is joined to the body of the tree) lying at the ſame diſtance and poſture as they grew upon the tree for its whole length. The bodies of ſome of theſe trees are not corrupted through age, but quite conſumed and reduced to aſhes by the annual burnings of the Indians when they ſet their grounds on fire, which yet has, it ſeems, no power over theſe hard knots beyond a black ſcorching, although, being laid on heaps, they are apt enough to burn. It is of theſe knots they make their tar in New-England and the country adjacent, whilſt they are well impregnated with that terebinthine and reſinous matter, which, like a balſam, preſerves them ſo long from putrefaction. The reſt of the tree does indeed contain the like terebinthine ſap, as appears, upon any ſlight inciſion of the bark on the ſtem or boughs, by a ſmall cryſtalline pearl which will ſweat out; but this, for being more watery and indigeſted,

See Plin. Hiſt. Nat. lib. xvi. cap. xi. or rather Theophraſtus Hiſt. lib. ix. cap. ii, iii. & lib. xiv. cap. xx. lib. xxiii. cap. i. lib. xxiv. cap. vi.

Book II. by reaſon of the poroſity of the wood, which expoſes it to the impreſſions of the air and wet, renders the tree more obnoxious, eſpecially if it lie proſtrate with the bark on, which is a receptacle for a certain intercutaneous worm that accelerates its decay. They are the knots then alone which the tar-makers amaſs in heaps, carrying them in carts to ſome convenient place not far off, where, finding clay or loam fit for their turn, they lay an hearth of ſuch ordinary ſtone as they have at hand: This they build to ſuch an height from the level of the ground, that a veſſel may ſtand a little lower than the hearth to receive the tar as it runs out. But firſt the hearth is made wide, according to the quantity of knots to be ſet at once, and that with a very ſmooth floor of clay, yet ſomewhat deſcending, or dripping from the extream parts to the middle, and thence towards one of the ſides, where a gullet is left for the tar to run out at. The hearth thus finiſhed, they pile the knots one upon another, after the very ſame manner as our colliers do their wood for charcoal, and of a height proportionable to the breadth of the hearth, and then cover them over with a coat of loam or clay, which is beſt, or, in defect of thoſe, with the beſt and moſt tenacious earth the place will afford, leaving only a ſmall ſpiracle at the top, whereat to put the fire in, and making ſome little holes round about, at ſeveral heights, for the admiſſion of ſo much air as is requiſite to keep it burning, and to regulate the fire by opening and ſtopping them at pleaſure. The proceſs is almoſt the ſame with that of making charcoal; for, when it is well on fire, the middle hole is alſo ſtopped, and the reſt of the regiſters ſo governed as the knots may keep burning, and not be ſuffocated with too much ſmoak, whilſt, all being now thorough-heated, the tar runs down to the hearth, together with ſome of the more watery ſap, which, haſtening from all parts towards the middle, is conveyed by the forementioned gutter into the barrel or veſſel placed to receive it. Thus the whole art of tar-making is no other than a kind of rude diſtillation *per deſcenſum*, and might therefore be as well done in furnaces of large capacity, were it worth the expence. When the tar is now all melted out and run, they ſtop up all the vents very cloſe, and afterwards find the knots made into excellent charcoal, preferred by the ſmiths before any other whatſoever which is made of wood, and nothing ſo apt to burn out when their blaſt ceaſeth; neither do they ſparkle in the fire as many other ſorts of coal do; ſo as, in defect of ſea-coal, they make choice of this as beſt for their uſe, and give greater prices for it. Of theſe knots likewiſe do the planters ſplit out ſmall ſlivers about the thickneſs of one's finger, or ſomewhat thinner,

which ſerve them to burn inſtead of candles, giving a very good light. This they call candle-wood, and it is in much uſe, both in New-England, Virginia, and amongſt the Dutch planters in their villages; but for that it is ſomething offenſive, by reaſon of the much fuliginous ſmoak which comes from it: They commonly burn it in the chimney corner, upon a flat ſtone or iron, except, occaſionally, they carry a ſingle ſtick in their hand as there is need of light to go about the houſe. It muſt not be conceived, by what we have mentioned in the former deſcription of the knots, that they are only to be ſeparated from the bodies of the trees by devouring time, or that they are the only materials out of which tar can be extracted; for there are in theſe tracts millions of trees which abound with the ſame ſort of knots, and full of turpentine fit to make tar: But the labour of felling theſe trees, and of cutting out their knots, would far exceed the value of the tar, eſpecially in countries where workmen are ſo very dear: But thoſe knots above-mentioned are provided to hand, without any other labour than the gathering only. There are ſometimes found of thoſe ſort of Pine-trees, the loweſt part of whoſe ſtems towards the root is as full of turpentine as the knots; and of theſe alſo may tar be made. But ſuch trees being rarely found, are commonly preſerved to ſplit into candle-wood, becauſe they will be eaſily riven out into any lengths and ſcantlings deſired, much better than the knots. There be, who pretend an art of as fully impregnating the body of any living Pine-tree, for ſix or eight feet high; and ſome have reported that ſuch an art is practiſed in Norway. But, upon ſeveral experiments, by girdling the tree, as they call it, and cutting ſome of the bark round, and a little into the wood of the tree, ſix or eight feet diſtant from the ground, it has never yet ſucceeded. Whether the juſt ſeaſon of the year was not obſerved, or what elſe omitted, were worth the diſquiſition, if at leaſt there be any ſuch ſecret amongſt the Norwegians, Swedes, or any other nation. Of tar, by boiling it to a ſufficient height, is pitch made; and in ſome places where roſin is plentiful, a fit proportion of that may be diſſolved in the tar whilſt it is boiling, and this mixture is ſooneſt converted to pitch; but it is of ſomewhat a differing kind from that which is made of tar only, without other compoſition. There is a way which ſome ſhip-carpenters in thoſe countries have uſed, to bring their tar into pitch for any ſudden uſe, by making the tar ſo very hot in an iron kettle, that it will eaſily take fire, which, when blazing, and ſet in an airy place, they let burn ſo long, till, by taking out ſome ſmall quantity for trial, being cold, it appears of a ſufficient conſiſtence: Then by covering the kettle cloſe,

BOOK II. the fire is extinguiſhed, and the pitch is made without more ceremony. There is a proceſs of making roſin alſo out of the ſame knots, by ſplitting them out into thin pieces, and then boiling them in water, which will educe all the reſinous matter, and gather it into a body, which, when cold, will harden into pure roſin. It is moreover to be underſtood, that the Fir, and moſt coniferous trees, yield the ſame concretes, lachrymæ, turpentines, roſins, hard, naval or ſtone, and liquid pitch, and tar for a remedy againſt arthritic and pulmonic affections: Theſe the Chururgeon uſes in plaiſters—and they are applied to mechanic, and other innumerable purpoſes. From their fuliginous vapour raiſed by burning, eſpecially the roſin, we have our lamp and printers' black. I am perſuaded the Pine, Pitch, and Fir-trees in Scotland might yield his Majeſty plenty of excellent tar, was ſome induſtrious perſon employed about the work, ſo as I wonder it has been ſo long neglected. But there is another proceſs, not much unlike the former, which is given us by Joſeph Georgirenes, the preſent Archbiſhop of Samos, in his deſcription of that, and other iſlands of the Ægæan.

Their way of making pitch, ſays he, is thus: They take ſapines, that is, that part of the Fir ſo far as it hath no knots; and, ſhaving away the extream parts, leave only that which is neareſt to the middle, and the pith: That which remains they call *Dadi*, from the old Greek word Δαδες, whence the Latin, *Tæda*. Theſe they ſplit into ſmall pieces, and, laying them on a furnace, put fire to the upper part till they are all burnt, the liquor in the mean time running from the wood, and let out from the bottom of the furnace into a hole made in the ground, where it continues like oil: Then they put fire to it, and ſtir it about till it thicken and has a conſiſtence: After this, putting out the fire, they caſt chalk upon it, and draw it out with a veſſel, and lay it in places cut out of the ground, where it receives both its form and a firmer body for eaſy tranſportation. Thus far the Archbiſhop; but it is not ſo inſtructive and methodical as what we have deſcribed above.

Other proceſſes for extracting of theſe ſubſtances may be ſeen in Mr. Ray's Hiſtory of Plants, already mentioned, lib. xxix. cap. i. And as to pitch and tar, how they make it near Marſeilles, in France, from the Pines growing about that city, ſee Philoſophical Tranſactions, N°. 243, p. 291, anno 1696, very well worthy the tranſcribing, if what is mentioned in this chapter were at all defective.

CHAP. I.
LARIX.

I had, in the former editions of Silva, placed the Larix among the trees which ſhed their leaves in winter, as indeed does this, but not before there is an almoſt immediate ſupply of freſh; and may therefore, both for its ſimilitude, ſtature, and productions, challenge rank among the coniferous. We raiſe it of ſeeds, and it grows ſpontaneouſly in Stiria, Carinthia, and other Alpine countries. The change of the colour of the old leaf made an ignorant gardener of mine eradicate what I had brought up with much care, as dead: Let this therefore be a warning. The leaves are thin, pretty long and briſtly; the cones ſmall, grow irregular, as do the branches, like the Cypreſs, a very beautiful tree, the ponderous branches bending a little, which makes it differ from the Libanus Cedar, to which ſome would have it allied; nor are any found in Syria. Of the deep-wounded bark exudes the pureſt of our ſhop-turpentine, (at leaſt as reputed) as alſo the drug agaric. That it flouriſhes with us a tree of good ſtature, not long ſince to be ſeen about Chelmsford in Eſſex, ſufficiently reproaches our not cultivating ſo uſeful a material for many purpoſes, where laſting and ſubſtantial timber is required: For we read of beams of no leſs than an hundred and twenty feet in length, made out of this goodly tree, which is of ſo ſtrange a compoſition that it will hardly burn: *Et robuſta Larix igni impenetrabile lignum*; for ſo Cæſar found it in a caſtle he beſieged, built of it. The ſtory is recited at large by Vitruvius, lib. ii. cap. ix; but ſee what Philander ſays upon the place, on his own experience. Yet the coals thereof were held far better than any other for the melting of iron, and the lock-ſmith; and, to ſay the truth, we find they burn it frequently as common fuel in the Valtoline, if at leaſt it be the true Larix, which they now call Melere. There is abundance of this Larch timber in the buildings at Venice, eſpecially about the palaces in Piazza San Marco, where I remember Scamozzi ſays he himſelf uſed much of it, and infinitely commends it. Nor did they only uſe it in houſes, but in naval architecture alſo. The ſhip mentioned by Witſen (a late Dutch writer of that uſeful art) to have been found not long ſince in the Numidian ſea, twelve fathoms under water, was chiefly built of this timber and Cypreſs, both reduced to that induration and hardneſs, as greatly to reſiſt the fire and the ſharpeſt tool; nor was any thing periſhed of it, tho' it had lain above a thouſand and four hundred years ſubmerged. The decks were covered with linen and plates of lead, fixed with nails gilt; and the entire ſhip, which contained thirty feet in length, ſo ſtaunch, as not one drop of water had ſoaked into any room. Tiberius, we find, built that famous bridge to his Naumachia

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with this wood; and it ſeems to excel for beams, doors, windows, and maſts of ſhips; reſiſts the worm. Being driven into the ground, it is almoſt petrified, and will ſupport an incredible weight; which, and for its property of long reſiſting fire, makes Vitruvius wiſh they had greater plenty of it at Rome to make joiſts of, where the Forum of Auguſtus was (it ſeems) built of it, and divers bridges by Tiberius; for that, being attempted with fire, it is long in taking hold, growing only black without: And the timber of it is ſo exceedingly tranſparent, that cabbins being made of the thin boards, when in the dark night they have lighted candles in them, people who are at a diſtance without doors would imagine the whole room to be on fire, which is pretty odd, conſidering there is no material ſo (as they pretend) unapt to kindle. The Larix bears poliſhing excellently well, and the turners abroad much deſire it. Vitruvius ſays, it is ſo ponderous that it will ſink in water. It makes everlaſting ſpouts, pent-houſes, and featheridge, which need neither pitch or painting to preſerve them; alſo excellent pales, poſts, rails, pediments, and props for vines: To theſe add the palates on which our painters ſeparate and blend their colours. Before the uſe of canvas and bed-tick, it formed the tables on which the great Raphael and the famous artiſts of the laſt age eternized their ſkill *.

NOTES.

* The wood of the Larch-tree being extreamly ſolid, it admits of a fine poliſh or ſmooth firmneſs, which contributes to throw forth the colouring with uncommon luſtre:

——Annis non expugnabile lignum:
Illuſtrat pictoris opus.——

It is likewiſe thought to be inacceſſible to the attacks of worms; on which account, as well as not being liable to warp when ſawn and well ſeaſoned, the modern Italians uſe it for back-boards to place behind fine drawings when they frame and glaze them; as alſo for picture-frames, becauſe no other wood gives gilding ſuch force, brightneſs, and, as it were, a ſort of natural burniſh; and this is the grand ſecret why Italian gilding on wood is ſo much better than ours, which has often a tarniſhed ſpungy caſt, and looks like gilt gingerbread.



The Mulberry Tree

CHAP. II.

The MULBERRY*.

CHAP. II.

1. MORUS, the Mulberry. It may poſſibly be wondered by ſome why we ſhould inſert this tree amongſt our foreſt inhabitants; but we ſhall ſoon reconcile our induſtrious planter when he comes to underſtand the incomparable benefit of it, and that for its timber, durableneſs, and uſe for the joiner and carpenter, and to make hoops, bows, wheels, and even ribs for ſmall veſſels, inſtead of Oak, &c. though the fruit and the leaves had not the due value with us, which they deſervedly enjoy in other places of the world.

2. But it is not here I would recommend our ordinary black fruit bearer, though that be likewiſe worth the propagation, but that kind which is called the White Mulberry, which I have had ſent me out of Languedoc; one of a broad leaf, found there and in Provence, whoſe ſeeds being procured from Paris, where they have it from Avignon, ſhould be thus treated in the ſeminary.

NOTES.

* Of this genus there are ſix ſpecies.

1. MORUS *(Nigra)* foliis cordatis ſcabris. Hort. Cliff. 441. *Mulberry with rough heart-ſhaped leaves.* Morus fructu nigro. C. B. P. 459. *Mulberry with a black fruit. The common Mulberry.*

This is the common Black Mulberry-tree, which is cultivated for the delicacy of its fruit. It grows naturally in Perſia, from whence it was firſt brought to the ſouthern parts of Europe, but is now become common in every part of Europe where the winters are not very ſevere; for in the northern parts of Sweden theſe trees will not live in the open air; and in ſeveral parts of Germany they are planted againſt walls, and treated in the ſame way as the Peach, and other tender fruits, in this country.

2. MORUS *(Rubra)* foliis cordatis ſubtus villoſis, amentis cylindricis. Lin. Sp. Plant. 1399. *Mulberry with heart-ſhaped leaves which are hairy on their under ſide, and cylindrical katkins.* Morus Virginienſis arbor, loti arboris inſtar ramoſa, foliis ampliſſimis. Pluk. Phyt. tab. 246. *Virginia Mulberry branching like the Nettle-tree, having very large leaves.*

This tree will grow to the height of thirty or forty feet It ſends forth many large branches; and the bark of the young ſhoots is of a blackiſh colour. The leaves

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3. In countries where they cultivate them for the ſilk-worm and other uſes, they ſow the perfectly mature berries of a tree, whoſe leaves have not been gathered. Theſe they ſhake down upon an old ſheet ſpread under the tree, to protect them from gravel and ordure, which will hinder you from diſcerning the ſeed. If they be not ripe, lay them to mature upon ſhelves, but by no means till they corrupt; to prevent which, turn them daily; then put them in a fine ſieve, and plunging them in water, bruiſe them with your hand: Do this in ſeveral waters, then change them in other clear water, and the ſeed will ſink to the bottom, whilſt the pulp ſwims, and muſt be taken off carefully. This done, lay them to

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are larger than the common Mulberry, and rougher, though in other reſpects they ſomewhat reſemble them. It produces plenty of katkins, in ſhape like thoſe of the Birch-tree; and the female flowers are ſucceeded by a dark reddiſh fruit. This is a very ſcarce plant at preſent, notwithſtanding it bears the ſeverity of our climate extremely well.

3. Morus *(Alba)* foliis obliquè cordatis lævibus. Hort. Cliff. 441. *Mulberry with oblique, ſmooth, heart-ſhaped leaves.* Morus fructu albo. C. B. P. 459. *Mulberry with a white fruit.*

This tree will grow to a large ſize, and is very proper for walks and avenues, or for clumps or ſtandards, either in fields or parks. The leaves are of a clear light green, and the fruit is of a paler colour than any of the other ſorts, which makes it take the name of the White Mulberry. This tree poſſeſſes the peculiar property of breeding no vermin, either when growing or cut down; neither does it harbour any caterpillar, the ſilk-worm excepted. This ſpecies is cultivated for its leaves in France and Italy to feed ſilk-worms; and, when raiſed for that uſe, the tree ſhould not be ſuffered to grow tall. The leaves ſhould be ſhorn off together with the tender twigs, which injures the plant much leſs than pulling them by the hand. This kind ſhould be raiſed from ſeeds procured from the ſouth of France or Italy: For which conſult the notes upon p. 49.

4. Morus *(Tinctoria)* foliis obliquè cordatis acuminatis hirſutis. *Mulberry with oblique, heart-ſhaped, acute-pointed, hairy leaves.* Morus fructu viridi, ligno ſulphureo tinctorio. Sloan. Hiſt. Jam. 2. p. 3. *Mulberry with a green fruit, whoſe wood dyes a ſulphur colour. Fuſtick wood.*

This tree is better known by the title of Fuſtick, which is given to the wood, than by its fruit, which is of no eſtimation. It grows naturally in moſt of the iſlands in the Weſt-Indies, but more plentifully at Campeachy, where it abounds greatly. This wood is one of the commodities exported from Jamaica, where it grows in greater plenty than in any other of the Britiſh iſlands.——This tree, in the countries where it grows naturally, riſes to the height of ſixty feet or upward.

dry in the ſun upon a linen cloth, for which one hour is ſufficient, then fan and ſift it from the huſks, and reſerve it till the ſeaſon. This is the proceſs of curious perſons; but the ſowing of ripe Mulberries themſelves is altogether as good; and from the excrement of hogs, and even dogs, that will frequently eat them, they will riſe abundantly. Note, that in ſowing of the berry, it is good to ſquaſh and bruiſe them with fine ſifted mould; and if it be rich, and of the old bed, ſo much the better. They ſhould be interred, well moiſtened, and covered with ſtraw, and then rarely watered till they peep; or you may ſqueeze the ripe berries in ropes of hair or baſt, and bury them, as is preſcribed for Hips and Haws.

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The bark is of a light brown colour, with ſome ſhallow furrows. The wood is firm, ſolid, and of a bright yellow. It ſends out many branches on every ſide, covered with a white bark, and garniſhed with leaves about four inches long, which are broad at their baſe, and indented at the foot-ſtalk, where they are rounded; but one ſide is broader than the other, ſo that they are oblique to the foot-ſtalk; theſe diminiſh gradually, and end in acute points; they are rough like thoſe of the common Mulberry, of a dark green, and ſtand upon ſhort foot-ſtalks. Toward the end of the young branches come out ſhort katkins of a pale herbaceous colour; and in other parts of the ſame branches the fruit is produced, growing upon ſhort foot-ſtalks. The fruit is as large as a nutmeg, of a roundiſh form, full of protuberances like the common Mulberry, green within and on the outſide, and of a luſcious ſweet taſte when ripe.——This ſpecies is too tender to thrive in this country, unleſs preſerved in a warm ſtove. There are ſeveral of the plants now growing in the Chelſea garden, which were raiſed from ſeeds ſent from Jamaica by William Williams, Eſq; with many other curious ſorts, which are natives of that iſland. The ſeeds of this plant come up freely on a hot-bed; and when the plants are fit to remove, they ſhould be each planted in a ſeparate ſmall pot filled with freſh light earth, and plunged into a hot-bed of tanners' bark, and ſhaded from the ſun till they have taken new root. Let them be treated in the ſame way as other plants from thoſe hot countries, always keeping them in the tan-bed in the ſtove, where they will make good progreſs. Theſe plants retain their leaves great part of the year in the ſtove.

5. MORUS *(Papyrifera)* foliis palmatis, fructibus hiſpidis. Lin. Sp. Plant. 1399. *Mulberry with hand-ſhaped leaves and prickly fruit.* Morus ſativa, foliis urticæ mortuæ, cortice papyrifera. Kæmp. Amœn. 471. *Cultivated Mulberry, with leaves like the Dead Nettle, and of whoſe bark paper is made.*

This ſort grows naturally in China and Japan, where the inhabitants make paper of the bark. They cultivate the trees for that purpoſe on the hills and mountains, much after the ſame manner as Oſiers are cultivated here, cutting down the young ſhoots in autumn for their bark. A few years ago there were ſeveral of

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The earth in which you ſow them ſhould be fine mould, and as rich as for Melons, raiſed a little higher than the area, as they make the beds for ordinary pot-herbs, to keep them looſe and warm; and in ſuch beds you may ſow ſeeds as you do purſlane, mingled with ſome fine earth, and thinly covered, and then for a fortnight ſtrewed over with ſtraw to protect them both from ſudden heat and from birds. The ſeaſon is April or May, though ſome forbear even till July and Auguſt, and in the ſecond quarter of the moon, the weather calm and ſerene. At the beginning, keep them moderately freſh, not over wet, and clean weeded, ſecured from the rigour of froſts. The ſecond year of their growth, about the beginning of October, or early ſpring, draw them gently out, prune the roots, and, dipping them a little in pond-water, tranſplant them in a warm place or nurſery. It is beſt ranging them in drills two feet large and one in depth, each drill three feet diſtant, and each plant two; and if thus the new earth be ſomewhat lower than the ſurface of the reſt, it will the better receive the rain. Being planted, cut them all within three inches of the ground.

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theſe trees raiſed in the gardens of his Grace the Duke of Northumberland from ſeed; and, when removed into the open air, bore the weather without injury. This plant makes very ſtrong vigorous ſhoots, but ſeems not to be of tall growth, for it ſends out many lateral branches from the root upward. The leaves are large, ſome of them are entire, others are deeply cut into three, and ſome into five lobes, eſpecially while the trees are young, dividing in form of a hand. They are of a dark green, and rough to the touch, but of a pale green, and ſomewhat hairy on their under ſide, falling off on the firſt approach of froſt in autumn, as do thoſe of the common Mulberry. The deſcription which Kæmpfer gives of the fruit is, that they are a little larger than peaſe, ſurrounded with long purple hairs, are compoſed of acini or protuberances, and, when ripe, change to a black purple colour, and are full of ſweet juice.

6. Morus *(Indica)* foliis ovato-oblongis utrinque æqualibus, inæqualiter ſerratis. Flor. Zeyl. 337. *Mulberry with oval oblong leaves, which are equal on both ſides, but unequally ſawed.* Tinda-parua Hort. Mal.

This kind grows naturally in India, where it becomes a large tree. It hath a ſoft, thick, yellowiſh bark, with a milky juice like the Fig, which is aſtringent. The branches come out on every ſide, and are garniſhed with oblong oval leaves, ſtanding upon ſhort foot-ſtalks. Both ſides of theſe leaves are equal, but their edges are unequally ſawed. They are rough, of a dark green on their upper ſide, but pale on their under, ſtanding alternately on the branches. The flowers come out in round heads at the foot-ſtalks of the leaves on each ſide the branches; they are of an herbaceous white colour; the male flowers have four ſtamina;

Water them not in winter but in extream neceſſity, and when the weather is warm, and then do it in the morning. In this cold ſeaſon you will do well to cover the ground with the leaves of trees, ſtraw, or ſhort litter, to keep them warm; and every year you ſhould give them three dreſſings or half-diggings, viz. in April, June, and Auguſt; this, for the firſt year, ſtill after rain. The ſecond ſpring after tranſplanting, purge them of all ſuperfluous ſhoots and cions, reſerving only the moſt towardly for the future ſtem: This to be done yearly as long as they continue in the nurſery; and if, of the principal ſtem ſo left, the froſt mortify any

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the female flowers are ſucceeded by roundiſh fruit, which are firſt green, afterwards white, and when ripe turn to a dark red colour.—The plants are too tender to live out of a ſtove in this country.

The Mulberry is of the claſs and order *Monoecia Tetrandria*, which contains thoſe plants that have male and female flowers at ſeparate diſtances upon the ſame plant, the male flowers having four ſtamina.

It is generally obſerved that the old Mulberry-trees are not only more fruitful than the young, but their fruit is much larger and better flavoured; ſo that where there are any of theſe old trees, it is the beſt way to propagate from them, and to make choice of thoſe branches which are moſt fruitful. The uſual method of propagating theſe trees, is by laying down their branches, which will take root in one year, and are then ſeparated from the old trees; but as the moſt fruitful branches are often ſo far from the ground as not to be layed, unleſs by raiſing of boxes or baſkets of earth upon ſupports for this purpoſe, ſo the better way is to propagate them by cuttings, which, if rightly choſen and ſkilfully managed, will generally ſucceed: And in this method there will be no difficulty in having them from trees at a diſtance, and from the moſt fruitful branches. Theſe cuttings ſhould be the ſhoots of the former year, with one joint of the two years wood to their bottom; the cuttings ſhould not be ſhortened, but planted their full length, leaving two or three buds above ground. The beſt ſeaſon for planting them is in March, after the danger of hard froſts is over. They ſhould be planted in light rich earth, preſſing the ground pretty cloſe about them; and if they are covered with glaſſes, it will forward their putting out roots; but where there is not ſuch conveniency, the ground about them ſhould be covered with moſs to prevent its drying; and where this is carefully done, the cuttings will require but little water. If the cuttings ſucceed well, and make good ſhoots, they may be tranſplanted the following ſpring into the nurſery, where they ſhould be regularly trained to ſtems by fixing down ſtakes, to which the principal ſhoots ſhould be faſtened; and moſt of the lateral branches ſhould be cloſely pruned off, leaving only two or three of the weakeſt to detain the ſap, for the augmentation of the ſtem; for when they are quite diveſted of their ſide-ſhoots, the ſap is mounted to the top, ſo that the heads

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part, cut it off, and continue this government till they are near ſix feet high; after which ſuffer them to ſpread into heads, by diſcreetly pruning and faſhioning them: But if you plant where cattle may endanger them, the ſtem had need be taller, for they are extreamly liquoriſh of the leaves.

4. When they are about five years growth you may tranſplant them without cutting the root, provided you eradicate them with care, only trimming the head a little. The ſeaſon is from September to November

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of the trees grow too faſt for the ſtems, and become too weighty for their ſupport. After four years growing in the nurſery they will be fit to tranſplant where they are to remain; for theſe trees are tranſplanted with greater ſafety while young, than when they are of a large ſize.

If the cuttings are planted in a bed fully expoſed to the ſun, it will be proper to arch the bed over with hoops, that they may be ſhaded with mats in the heat of the day during the ſpring, till they have put out roots; after which, the more they are expoſed to the ſun, the better they will ſucceed, provided the ground is covered with moſs or mulch to prevent its drying; for the ſun will harden the ſhoots, whereby the plants will be in leſs danger of ſuffering by the early froſts in autumn; for when theſe are in a ſhady ſituation, they are apt to grow vigorouſly in ſummer; and, being replete with moiſture, the early froſts in October frequently kill their tops. If the following winter proves ſevere, they are often killed to their roots, and ſometimes are entirely deſtroyed. Mr. Miller recommends the cuttings to be planted on a hot-bed; and he informs us that he was led to this improvement by obſerving ſome ſticks of Mulberry-trees which were cut for forks, and thruſt into the hot-bed to faſten down the vines of cucumbers; which, although they had been cut from the tree a conſiderable time, yet many of them put out roots and ſhot out branches; ſo that when any perſon is in haſte to propagate theſe trees, if the cuttings are planted on a moderate hot-bed, they will take root much ſooner than in the common ground.

This tree delights to grow in a light rich earth, ſuch as is in moſt of the old kitchen gardens about London; for in ſome of thoſe gardens there are trees of a very great age, which are very healthy and fruitful, and their fruit is larger and better flavoured than that of younger trees. I have never yet ſeen any of theſe trees which were planted in a very ſtiff ſoil, or on ſhallow ground, either upon clay, chalk, or gravel, which have been healthy or fruitful; their ſtems and branches are generally covered with moſs, ſo that the little fruit which they produce, is ſmall, ill taſted, and late before it ripens.

If theſe trees are planted in a ſituation where they are defended from the ſtrong ſouth and north-weſt winds, it will preſerve their fruit from being blown off; but this ſhelter, whether it be trees or buildings, ſhould be at ſuch a diſtance as not to keep off the ſun; for where the fruit has not the benefit of his rays to diſſipate the morning dews, it will turn mouldy and rot upon the trees.

in the new moon; and if the holes or pits you ſet them in were dug and prepared ſome months before, it would much ſecure their taking. Some caſt horns, bones, ſhells, &c. into them, the better to looſen the earth, which ſhould be rich, and well refreſhed all ſummer. A light and dry mould is beſt, well expoſed to the ſun and air, which above all things this tree affects, and hates watery low grounds. In ſum, being a very laſting tree, it thrives beſt where Vines proſper moſt, whoſe ſociety it exceedingly cheriſhes; nor does it leſs delight to be amongſt Corn, no way prejudicing it with its ſhade. The diſtance of theſe ſtandards ſhould be twenty or twenty-four feet every way, if you would deſign walks or groves of them; if the environs of fields, banks of rivers, highways, &c. twelve or fourteen feet may ſuffice, but the farther diſtant the better: The White ſpreads its roots much farther than the Black, and likes the valley more than the higher ground.

5. Another expedient to increaſe Mulberries, is by layers from the ſuckers at the foot; this ſhould be done in ſpring, leaving not above two buds out of the earth, which you muſt diligently water, and the ſecond year they will be rooted. They will alſo take by paſſing any branch, or arm, ſlit and kept a little open with a wedge, or ſtone, through a baſket of earth, which is a very ſure way. Nay, the very cuttings will ſtrike in ſpring; but let them be from ſhoots of two years growth, with ſome of the old wood, though of ſeven or eight years; theſe ſet in rills, like vines, having two or three buds at the top, will root infallibly, eſpecially if you twiſt the old wood a little, or at leaſt hack it; though ſome ſit the foot, inſerting a ſtone, or grain of an oat to ſuckle and entertain the plant with moiſture.

6. They may alſo be propagated by graſting them on the Black Mulberry in ſpring, or inoculated in July, taking the cions from ſome old tree that has broad, even, and round leaves, which cauſes it to produce very ample and tender leaves, of great emolument to the ſilk-maſter.

7. Some experienced huſbandmen adviſe to poll our Mulberries every three or four years, as we do our Willows; others not till eight years; both erroneouſly. The beſt way is yearly to prune them of their dry and ſuperfluous branches, and to form their heads round and natural. The firſt year of removal where they are to abide, cut off all the ſhoots to five or ſix of the moſt promiſing; the next year leave not above three of theſe,

Book II. which diſpoſe in triangle as near as may be, and then diſturb them no more, unleſs it be to purge them (as we taught) of dead ſear-wood and extravagant parts, which may impeach the reſt; and if afterward any pruned branch ſhoot above three or four cions, reduce them to that number. One of the beſt ways of pruning, is what they practiſe in Sicily and Provence, to make the head hollow and like a bell, by cleanſing them of their inmoſt branches; and this may be done either before they bud, viz. in the new moon of March, or when they are full of leaves in June or July, if the ſeaſon prove any thing freſh. Here I muſt not omit what I read of the Chineſe culture, and which they now alſo imitate in Virginia, where they have found a way to raiſe theſe plants of the ſeeds, which they mow and cut like a crop of graſs, which ſprout and bear leaves again in a few months. They likewiſe in Virginia have planted them in hedges, as near together as we do gooſeberries and currants, for their more convenient clipping, which they pretend to do with ſciſſors.

8. The Mulberry is much improved by ſtirring the mould at the root, and letation.

9. We have already mentioned ſome of the uſes of this excellent tree, eſpecially of the White, ſo called becauſe the fruit is of a paler colour, which is alſo of a more luſcious taſte and leſſer than the Black; the rind likewiſe is whiter, and the leaves of a mealy clear green colour, far tenderer, and ſooner produced by at leaſt a fortnight, which is a marvellous advantage to the newly-diſcloſed ſilk-worm; alſo they arrive ſooner at their maturity, and the food produces a finer web. Nor is this tree leſs beautiful to the eye than the faireſt Elm, very proper for walks and avenues. The timber, amongſt other properties, will laſt in the water as well as the moſt ſolid Oak, and the bark makes good and tough baſt ropes. It ſuffers no kind of vermin to breed on it, whether ſtanding or felled, nor dare any caterpillar attack it, ſave the ſilk-worm only. The loppings are excellent fuel; but that for which this tree is in greateſt and moſt worthy eſteem, is for the leaves, which, beſides the ſilk-worm, nouriſhes cows, ſheep, and other cattle, eſpecially young porkers, being boiled with a little bran. The fruit is excellent to feed poultry. In ſum, whatever eats of them will with difficulty be reduced to endure any thing elſe, as long as they can come by them. To ſay nothing of their other ſovereign qualities, as relaxing of the belly, being eaten in the morning, and curing inflammations and ulcers of the mouth and throat, mixed with

mel roſarum, in which receipt they do beſt when taken before they are over ripe. I have read that in Syria they make bread of them, but that the eating of it makes men bald. As for drink, the juice of the berry mixed with cyder-apples makes an excellent liquor both for colour and taſte.

10. To proceed with the leaf, for which the Mulberry is chiefly cheriſhed, the benefit of it is ſo great, that they are frequently let to farm for vaſt ſums; ſo as one ſole tree has yielded the proprietor a rent of twenty ſhillings per annum for the leaves only, and ſix or ſeven pounds of ſilk, worth as many pounds ſterling, in five or ſix weeks, to thoſe who kept the worms. We know that, till after Italy had made ſilk above a thouſand years, they received it not in France, it being hardly yet an hundred ſince they betook themſelves to this manufacture in Provence, Languedoc, Dauphine, Lionois, &c. and not in Orleanois till Henry the Fourth's time; but it is incredible what a revenue it now amounts to in that kingdom. About the ſame time, or a little after, it was that King James did, with extraordinary care, recommend it to this nation by a book of directions, acts of council, and all other princely aſſiſtance. But this did not take no more than that of Henry the Fourth's propoſal about the environs of Paris, who filled the highways, parks, and gardens of France with the trees, beginning in his own gardens for encouragement. Yet I ſay this could not be brought into example till this preſent great Monarch, Lewis XIV. (by the indefatigable diligence of Monſieur Colbert, Superintendant of his Majeſty's manufactures) ſo ſucceſsfully revived it, that it is prodigious to conſider what an happy progreſs they have made in it; to our ſhame be it ſpoken, who have no other diſcouragements from any inſuperable difficulty whatever, but our ſloth and want of induſtry; ſince wherever theſe trees will grow and proſper, the ſilk-worms will do ſo alſo; and they were likewiſe averſe, and from the very ſame ſuggeſtions, where now that manufacture flouriſhes in our neighbour countries. It is demonſtrable that Mulberries in four or five years may be made to ſpread all over this land; and when the indigent and young daughters in proud families are as willing to gain three or four ſhillings a day for gathering ſilk and buſying themſelves in this ſweet and eaſy employment, as ſome do to get four pence a day for hard work at hemp, flax, and wool, the reputation of Mulberries will ſpread in England and other plantations. I might ſay ſomething like this of Saffron, which

Book II. we yet too much neglect the culture of; but which, for all this, I do not despair of seeing reassumed when that good genius returns *. In order to this hopeful prognostic, we will add a few directions about the gathering of the leaves, to render this chapter one of the most accomplished, for certainly one of the most accomplished and agreeable works in the world.

11. The leaves of the Mulberry should be collected from trees of seven or eight years old; if of such as are very young, it impairs their growth, neither are they so healthful for the worms, making them hydropical and apt to burst; as do also the leaves of such trees as be planted in a too watrish or over rich soil, or where no sun comes, and all sick and yellow leaves are hurtful. It is better to clip, and let the leaves fall upon a subtended sheet or blanket, than to gather them by hand; and to gather them, than to strip them, which mars and gauls the branches, and bruises the leaves that should hardly be touched. Some there are who lop off the boughs and make it their pruning; and it is a tolerable way, so it be discreetly done in the over thick parts of the tree; but these leaves, gathered from a separated branch, will die, and wither much sooner than those which are taken from the tree immediately, unless you set the stem in water. Leaves gathered from boughs cut off will shrink in three hours; whereas those you take from the living tree will last as many days; and, being thus a while kept, are better than over fresh ones. It is a rule never to gather in a rainy season, nor cut any branch whilst the wet is upon it; and therefore against such suspected times you are to provide before-hand, and to reserve them in some fresh but dry place. The same caution you must observe for the dew, though it do not rain, for wet food kills the worms. But if this cannot be altogether prevented, put the leaves be-

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* This seems a prophetic expression, as Saffron is now cultivated very largely at Saffron-Walden, in Essex. The English Saffron is greatly superior to that which grows in France or Spain. Its cultivation employs a number of women and children; and it were to be wished that every encouragement was given to the culture of such plants as employ the hands of the feeble poor. In this excellent chapter upon the Mulberry-tree, Mr. Evelyn endeavours to prove that Silk may be produced in this country to a great national advantage. The food of the Silk-worm certainly grows with great luxuriancy in every part of this island, and, from many accurate experiments made upon every branch of the business, we may venture to conclude that the manufacture of raw Silk may be successfully, and profitably, conducted in all the Southern Counties of Great-Britain.

tween a pair of ſheets well dried by the fire, and ſhake them up and down till the moiſture be drunk up in the linen; and then ſpreading them to the air a little, on another dry cloth, you may feed with them boldly. The top-leaves and oldeſt ſhould be gathered laſt of all, as being moſt proper to repaſt the worms with, towards their laſt change. The gatherer muſt be neat, have his hands clean and his breath ſweet, and not poiſoned with onions or tobacco, and be careful not to preſs the leaves, by crouding them into the bags or baſkets. Laſtly, That they gather only, unleſs in caſe of neceſſity, leaves from the preſent, not from the former year's ſprigs or old wood, which are not only rude and harſh, but are annexed to ſtubbed ſtalks which injure the worms, and ſpoil the denudated branches. One note more let me add, That in firſt hatching, the eggs ſometimes diſcloſe earlier than there is proviſion for them on the tree, in which caſe the tender leaves of Lettuce, Dandelion, or Endive may ſupply the defect, ſo they feed not on them too long or over much, which gives them the laſk.

12. This is what I thought fit to premoniſh concerning the gathering of the leaves of this tree for ſilk-worms, as I find it in Monſieur Iſnard's Inſtructions, and that exact diſcourſe of his publiſhed ſome years ſince, and dedicated to Monſieur Colbert, (who has, it ſeems, conſtituted this induſtrious and experienced perſon ſurveyor of this princely manufacture about Paris) and becauſe the book itſelf is rare, and known by very few. I have no more to add but this for our encouragement, and to encounter the objections which may be ſuggeſted about the coldneſs and moiſture of our country, that the ſpring is in Provence no leſs inconſtant than is ours in England; that the colds at Paris are altogether as ſharp; and that in May, when it has continued raining for nine-and-twenty days ſucceſſively, Monſieur Iſnard aſſures us he proceeded in his work without the leaſt diſaſter; and in the year 1664 he preſented the French King, his maſter, with a conſiderable quantity of better ſilks than Meſſina or Bononia could produce, which he ſold raw at Lyons for a piſtole the pound, when that of Avignon, Provence, and Dauphine produced little above half that price. But you are to receive the compleat hiſtory of the ſilk-worm from that incomparable treatiſe which the learned Malpighius has lately ſent out of Italy, and dedicated to the Royal Society, as a ſpecimen and noble effect of its univerſal correſpondence and concernments for the improvement of uſeful knowledge. To this I add that beneficial paſſage of the learned Dr. Beal, communicated in the twelfth volume of the Philoſophical Tranſactions, N°. 133, p. 816, where we find recommended the promotion of

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this tree in England, from its ſucceſs in ſeveral northern countries, and even in the moiſt places of Ireland. He ſhows how it may be improved by graffing on the Fig, or the larger Black Mulberry on that of the ſmalleſt kind: Alſo of what requeſt the Diamoron, or Guidenie, made of the juice of this fruit, was with the antients, with other excellent obſervations. What other incomparable remedies the fruit of this tree affords, ſee Pliny's Natural Hiſtory, lib. xxiii. chap. vii. There is a Mulberry-tree brought from Virginia, not to be contemned, upon which they find ſilk-worms, which would exceed the ſilk of Perſia itſelf, if the planters of nauſeous tobacco did not hinder the culture. Sir Jo. Berkley, who was many years Governor of that ample colony, told me he preſented the King (Charles II.) with as much ſilk made there as made his Majeſty a compleat ſuit of apparel.

Laſtly, Let it not ſeem altogether impertinent if I add one premonition to thoſe leſs-experienced Gardeners, who frequently expoſe their Orange, and like tender furniture-trees of the green-houſe, too early: That the firſt leaves putting forth of this wiſe tree (*Sapientiſſima*, as Pliny calls it) is a more infallible note when thoſe delicate plants may be ſafely brought out to the air, than any other prognoſtic or indication. For other ſpecies, vid. *Raii Dendr.* p. 12.



The Cedar of Tree.

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CHAP. III.

The CEDAR *, JUNIPER, CYPRESS, SAVINE, TAMARISK, and THUYA.

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1. BUT now after all the beautiful and ſtately trees, clad in perpetual verdure, ſhould I forget the CEDAR, which grows in all extreams; in the moiſt Barbadoes, the hot Bermudas, (I ſpeak of thoſe trees ſo denominated) the cold New-England, even where the ſnows lie, as I am told, almoſt half the year; for ſo it does on the mountains of Libanus, from whence I have received cones and ſeeds of thoſe few remaining trees. Why then ſhould they not thrive in Old England? I know not, ſave for want of induſtry and trial.

They grow in the bogs of America, and in the mountains of Aſia, ſo as there is, it ſeems, no place or clime which affrights it. And I have frequently raiſed them from their ſeeds and berries, of which we have the very beſt in the world from the Summer-Iſlands, though now almoſt ex-

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* The Cedar of Lebanon is now claſſed with the Pines; and the other Cedars deſcribed by Mr. Evelyn, are claſſed with the Junipers. But as I did not chooſe to diſturb the order of the chapters, I have reſerved the deſcription of the Cedar for this place. Linnæus calls it *Pinus foliis faſciculatis acutis*. Sp. Pl. 1420.

This tree is generally ſuppoſed to be an inhabitant of mount Libanus only, but it is now found upon mount Taurus, Amanus, &c; and, from its hardy nature, it is probable that it may eaſily be naturalized to any climate.

Having procured the cones, whether from the Levant or of our own growth, the ſeeds, a little before ſowing, ſhould be got out in this manner: Let a hole be bored with a paſſer exactly up the center of each cone, from the baſe to the apex; put them into a tub of water, where they may remain till the next day; then having a wooden peg, rather bigger than the paſſer, let it be thruſt down the hole, and it will ſo divide the cones, that the different ſcales may be taken away, and the ſeeds picked out. In doing this, great care muſt be taken not to bruiſe or hurt the ſeeds, which will then be very tender.

The ſoil in which you ſow theſe ſeeds ſhould be rather of a ſandy nature; or, for want of this, ſome mould taken freſh from a rich paſture, and ſieved with a little drift ſand, will ſerve the purpoſe.

Having the ſeeds ready, let them be ſown about the middle of March in pots or boxes near half an inch deep. In about ſeven or eight weeks the plants will come

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hauſted by the unaccountable negligence of the planters; as are likewiſe thoſe of mount Libanus, by the wandering and barbarous Arabs. The Cedars we have from Jamaica are a ſpurious ſort, and the wood ſo porous that wine will ſink into it. On the contrary, that of Carolina is ſo firm and cloſe, that barrels and other veſſels preſerve the ſtrongeſt ſpirits in vigour. The New-England Cedar is a lofty grower, and proſpers into excellent timber, which, being ſawed into planks, makes delicate floors. They ſhingle their houſes alſo with it, and generally employ it in all their buildings. Why have we no more of it brought us, to raiſe, plant, and convert to the ſame uſes? There is the Oxycedrus of Lycia, which the Architect Vitruvius deſcribes to have its leaf like the Cypreſs;

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up, when they ſhould be removed into the ſhade from the heat of the ſun, where they may ſtand, but not under ſhelter, all the ſummer; during which time they ſhould be kept clean of weeds, and watered now and then. In the winter ſeaſon they muſt be removed into a warmer ſituation; or, if it is likely to prove very ſevere, they ſhould be ſheltered either by mats, or removed into the green-houſe, or covered with an hot-bed frame; for they are ſubject to loſe their young tops at firſt by the ſeverity of froſts.

In the beginning of April following, theſe plants may be pricked out, in beds, four inches aſunder; and if the weather proves dry, they ſhould be ſhaded and watered till they have taken root; after which they will want little ſhading and leſs watering. Indeed, nothing more is required than keeping them clean from weeds, and covering the ground ſo as to keep it moiſt, and prevent its chapping by the ſun's rays. In theſe beds they may remain two years, when, in the ſpring, they ſhould be tranſplanted to the nurſery, where they may remain till they are planted out for good.

During the time they are in the nurſery, and after planting out, many will have a tendency to droop in their leading ſhoot. As ſoon, therefore, as this is perceived, an upright ſtake muſt be driven into the ground, to which the ſhoots ſhould be tied with baſs matting to keep them in their upright growth. This, however, will not always effect it; for I have known ſome, after being tied, ſo effectually turn the ſhoot downwards over the bandage, though looſe, as to appear as if they were beat down on purpoſe. The Larch-tree, which is nearly allied to this ſpecies, will ſometimes rebel in this way; ſo that I think it would not be amiſs, in both caſes, whenever they firſt diſcover any ſigns of ſuch a tendency, to lighten the head by nipping off the extremities of ſome few of the largeſt branches.

When theſe trees are planted out for good they ſhould be left to nature, after being properly fenced. Not a knife nor a hatchet ſhould come near them; lopping even their loweſt branches is ſo injurious, that it both retards their growth and diminiſhes their beauty.

It is matter of ſurprize that this tree hath not been more cultivated in England formerly; for, till within a few years paſt, it was very but few here; ſince it would

but the right Phœnician reſembles more the Juniper, bearing a cone not ſo pointed as the other, as we ſhall come to ſhew. CHAP. III.

After theſe, I ſhall not here deſcend to the inferior kinds, which ſome call Dwarfs, and common Juniper-like Shrubs, fitter to head the borders of coronary gardeners, and to be ſhorn. There is yet another of the North-America lighter than cork itſelf, of a fragrant ſcent, which is its only virtue.

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be a great ornament to barren bleak mountains, where few other trees will grow ſo well, it being a native of the coldeſt parts of mount Libanus, where the ſnow continues great part of the year. And, from the obſervations made of thoſe now growing in England, it is found they thrive beſt on the pooreſt ſoil; for ſuch of them as have been planted in a ſtrong, rich, loamy earth, have made but a poor progreſs, in compariſon to ſuch as have grown upon a ſtony meagre ſoil. And that theſe trees are of quick growth, is evident from four of them now growing in the phyſic garden at Chelſea, which, as I have been credibly informed, were planted there in the year 1683, and at that time were not above three feet high; two of which trees are at this time (viz. 1774) upwards of twelve feet and a half in girt, at two feet above ground, and their branches extend more than twenty feet on every ſide their trunks; which branches, though they are produced twelve or fourteen feet above the ſurface, do at every termination hang very near the ground, and thereby afford a goodly ſhade in the hotteſt ſeaſon of the year.

There are ſaid to be a few Cedar-trees remaining ſtill upon mount Libanus, which are preſerved with a religious ſtrictneſs: For we are informed, from the Memoirs of the Miſſionaries in the Levant, that, upon the day of the transfiguration, the Patriarch of the Maronites, (Chriſtians inhabiting mount Libanus) attended by a number of biſhops, prieſts, and monks, and followed by five or ſix thouſand of the religious from all parts, repairs to theſe Cedars, and there celebrates that feſtival which is called "The feaſt of Cedars." We are alſo told that the Patriarch officiates pontifically on this ſolemn occaſion; that his followers are particularly mindful of the Bleſſed Virgin on this day, becauſe the ſcripture compares her to the Cedars of Lebanon; and that the ſame holy father threatens with eccleſiaſtical cenſure thoſe who preſume to hurt or diminiſh the Cedars ſtill remaining.

The epithet of *lofty* given to the Cedar is by no means applicable, ſince from the experience we have of theſe trees growing in England, as alſo from the teſtimony of travellers who have viſited the few remaining ones on mount Libanus, they are not inclined to be lofty, but, on the contrary, extend their branches very wide. The Pſalmiſt makes a proper and fine alluſion to this tree in his deſcription of the flouriſhing ſtate of a people. "They ſhall ſpread their branches like the Cedar-tree."

Book II.

After all theſe exoticks brought from our plantations, anſwering to the name of Cedar, I ſhould eſteem that of the Bermuda little inferior, if not ſuperior to the nobleſt Libanon; and next, that of Carolina for its many uſes and laſting.

Having ſpoken of their ſeveral ſpecies, we come now to the culture. Theſe are beſt raiſed from the ſeeds, ſince it would be difficult to receive any ſtore from abroad. To begin with that of mount Libanus: Thoſe which ſeem of the greateſt antiquity are indeed majeſtical, extending the boughs and branches, with their cones *ſurſum ſpectantia*, as by moſt we are told; tho' a late traveller * found them otherwiſe, *depending*, like other coniferous trees. The ſturdy arms, though in ſmaller ſprigs, grow in time ſo weighty as often to bend the very ſtem and main ſhaft, whilſt that which is moſt remarkable, is the ſtructure of the cones and ſeed receptacles, tacked and ranged between the branch-leaves in ſuch order as nothing appears more curious and artificial, and at a little diſtance exceedingly beautiful. Theſe cones have the baſes rounder, ſhorter, or rather thicker, and with blunter points, the whole circum-zoned, as it were, with pretty broad thick ſcales, which adhere together in exact ſeries to the very top and ſummit, where they are ſomewhat ſmaller; but the entire lorication ſmoother couched than thoſe of the Fir-kind. Within theſe repoſitories, under the ſcales, neſtle the ſmall nutting ſeeds, or rather kernels, of a pear-ſhape; which, how nouriſhed and furniſhed from the central ſtyle, with their other integuments, is admirably deſcribed by Mr. Ray, as that of the ſtalk of the clogs, thicker and longer, and ſo firmly knit to them, that it requires conſiderable force to part them from the branch without ſplitting the arm itſelf. We have ſaid nothing concerning the leaf of this tree, which much reſembles thoſe of the Larix, but ſomewhat longer and cloſer ſet, erect and perpetually green, which thoſe of the Larch are not——but hanging down, drop off and deſert the tree in winter.

* Le Bruyn.

The ſeeds drop out of the cones as the Fir and Pine kernels do when the air, ſun, or moiſture open and unglue the ſcales, which naturally it elſe does not in thoſe of the Cedar till the ſecond year; but which, after all the preparations of burying in holes made in the earth and ſand, in which they are apter to rot, may more ſafely be done by expoſing the clogs diſcreetly to the ſun, or before a ſoft and gentle fire, or, I think, beſt of all, by ſoaking them in warm water.

The lachrymæ, gum, and other tranſudations ſerve more for unguents and the Chirurgeon's box, than for other medicaments, in which we find Pliny has little faith. But that which is more remarkable, is the virtue of the famous timber of this noble tree, being proof againſt all putrefaction of human and other bodies, above all other ingredients and compoſitions of embalmers; and that by a pretty contradiction, giving life, as it were, to the dead, and deſtroying the worms which are living, as it does where any goods are kept in cheſts and preſſes of the wood, excepting woollen cloth and furrs, which it is obſerved they corrupt. In the mean time, touching the manner of theſe operations, as it concerns the preſervation of the dead, ſee more where we ſpeak of Cypreſs; the effects being aſcribed to the extream bitterneſs of the reſinous juices, whilſt the odour is moſt grateful. The worthy Mr. Ray mentions the powder and ſaw-duſt of Cedar to be one of the greateſt ſecrets uſed by our Pollinctors and Mountebanks, who pretend to this embalming myſtery: And indeed, that the duſt and very chips are exitial to moths and worms, daily experience ſhews us; tho' none in mine, better than the dried leaves and ſtalks of Marum-Syriacum, familiarly planted in our gardens. What, therefore, the late traveller Dampier ſpeaks of Cedar, which he has ſeen worm-eaten, could neither be that of Libanus or Bermudas, but haply of Barbadoes, Jamaica, or ſome other ſpecies. Note, that the Cedar is of ſo dry a nature, that it does not well endure to be faſtened with nails, from which it uſually ſhrinks, and therefore pins of the ſame wood are better. Whatever other property this noble tree is deſervedly famous for, it is ſaid to yield an oil, which, above all other, beſt preſerves the monuments of the learned, books and writings; whence *Cedro Dignus* became one of the higheſt Elogies.

Touching the diuturnity of this material, it is recorded, that in the temple of Apollo at Utica, there was found timber of near two thouſand years old; and, at Saguntum, in Spain, in a certain Oratory conſecrated to Diana two centuries before the deſtruction of Troy, a beam, which has been brought to Zant: The great Seſoſtris, king of Egypt, built a veſſel of Cedar of two hundred and eighty cubits, all over gilded without and within: And the ſtatue of the goddeſs in the famous Epheſine Temple was ſaid to be of this material alſo, as was moſt of the timber-work of that glorious ſtructure. Though as to the idol τὸ Διοπετὲς mentioned in the Acts, (when the mob roſe up againſt the Apoſtle) ſome will have it to be of Ebony, others of a Vine-tree, the moſt unlikely of all the reſt

Book II. for the carver. The Sittim, mentioned in holy writ, is thought to have been a kind of Cedar, of which moſt precious utenſils were formed.

As to the magnitude of Cedar-trees, we read of divers whoſe bodies eight or nine perſons could not embrace, as we ſhall ſhew hereafter, not here to let paſs what Joſephus relates Solomon planted in Judea, who doubtleſs tried many experiments of this nature, none being more kingly than that of planting for poſterity. I do not ſpeak of thoſe growing on the mountains of Libanon, in the northern and colder tracts of Syria, or what ſtore thoſe foreſts of them then afforded. But, as we are informed
* In Itin. by that curious traveller Ranwolfius *, ſince confirmed alſo by the Virtuoſo Monconys, there were not remaining above twenty-five of thoſe ſtately trees; and ſince they were there, but ſixteen of that ſmall number, as the ingenious Mr. Mandeville reports in his journey from Aleppo to Jeruſalem: There was yet, he ſays, abundance of young trees, and a ſingle old one of a prodigious ſize, twelve yards and ſix inches in the girt. I ſuppoſe the ſame deſcribed by the late traveller Bruyn, who, ſpeaking of the ſhadow of this umbrageous tree, alludes to that of Hoſea xiv. 5, which, it is not improbable, might be one of thoſe yet remaining in the place, where that heroic prince employed fourſcore thouſand hewers at work for the materials of one only temple, and the palace he built in the city; a pregnant inſtance what time, negligence, and war will bring to ruin. But to return to what is ſaid of their preſent number, Le Bruyn, whom juſt now we mentioned, makes them thirty-five or thirty-ſix, for he could not exactly tell; and pretends, like our Stonhenge on Saliſbury plain, none could ever yet agree in their number.

In ſhort, upon reflection of what we have hitherto concerning the univerſal waſte and deſtruction of timber-trees, where due regard is not taken to propagate and ſupply them, whole countries have ſuffered as well as particular provinces. Thus the Appennines are ſtripped of their goodly Pine and Fir-trees (which formerly the Naturaliſt commends thoſe mountains for) to that degree, as to render not only the city of Florence, but Rome herſelf, ſo expoſed to the nipping Tramontans, (for ſo they call the northern winds) that almoſt nothing which is rare and curious will thrive without hyemation and art; ſo as, even through the moſt of thoſe parts of Italy, on this ſide the kingdom of Naples, flanked by the Alpeſtral hills, clad, as they perpetually are, with ſnow, they are fain to houſe and retire their Orange, Citron, and other delicate and tender plants as we do

in England. There remains yet one mountain among the Appennines, covered and crowned with Cypreſs, whereof ſome are of a conſiderable ſtature. Nor is all this indeed ſo great a wonder, if we find the entire ſpecies of ſome trees totally loſt in countries, as if there never had been any ſuch planted or growing in them. Be this applied to Fir and Pine, and ſeveral other trees, for want of culture, ſeveral accidents in the ſoil, air, &c. which we daily find produces ſtrange alterations in our woods, the Beech almoſt conſtantly ſucceeding the Oak, to our great diſadvantage, whilſt we neglect new ſeminations. Herodotus, ſpeaking of the Palms plentifully growing about Delos, ſays the whole ſpecies was utterly loſt. More I might add on this ſubject; but perhaps I have been too long on theſe remarks——and long enough on cold mount Libanus.

JUNIPER*.

1. Let it not ſeem unduly placed, if, after ſuch giants, we bring this humble ſhrub (ſuch as abound with us being ſo reckoned) to claim affinity to the talleſt Cedar; ſince, were not ours continually cropped, but

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* The real and diſtinct ſpecies of the Juniper are,

1. JUNIPERUS *(Communis)* foliis ternis patentibus mucronatis bacca longioribus. Lin. Sp. Plant. 1470. *Juniper with ſpreading ſharp-pointed leaves placed by threes.* Juniperus vulgaris fruticoſa. C. B. P. 488. *The Common Juniper.*

Of the Common Juniper there are two ſorts: 1. The Engliſh Juniper. 2. The Swediſh Juniper.

The Engliſh Juniper, though naturally of our own growth, is very little known in many parts of England; for it grows naturally only in dry, chalky, ſandy land; and where the ſoil is oppoſite to this, it is rarely found. Thus, in Leiceſterſhire it is ſo little known, that, when growing amongſt other trees in a ſhrubbery, it is as much enquired after as any of the moſt rare and curious ſorts; and indeed, when properly raiſed from ſeeds, and planted in gardens, it is a pretty ſpreading evergreen ſhrub. Thoſe who have been uſed to ſee it in its wild ſtate, on ſandy, barren commons, &c. will have little inducement to plant it, as there they will ſee it procumbent, ſeldom ſhewing a natural tendency to aſpire; but when planted in a good ſoil, it will grow to the height of fifteen or ſixteen feet, and will produce numerous branches from the bottom to the top, forming a well-looking, buſhy plant. Theſe branches are exceeding tough, and covered with a ſmooth bark of a reddiſh colour, with a gentle tinge of purple. The leaves are narrow and ſharp-pointed; they grow by threes on the branches; their upper ſurface has a greyiſh ſtreak down the middle, but their under is of a fine green

Book II. maintained in ſingle ſtems, we might perhaps ſee ſome of them rife to competent trees, fit for many curious works, ſuch as tables, cabinets, coffers, inlaying, floors, carvings, &c. We have of ſome of theſe trees ſo large as to have made beams and rafters for a certain temple in Spain, dedicated to Diana; nor need we queſtion their being fit for other buildings; celebrated for its emulating the Cedar, though not in ſtature, yet in its laſtingneſs; and ſuch, I think, the learned Dr. Sloane mentions growing in Jamaica, little inferior to the Bermudas.

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colour, and they garniſh the ſhrub in great plenty. This tree flowers in April and May. The flowers are ſmall, of a yellowiſh colour, and make no figure. They are ſucceeded by the berries, which are of a blueiſh purple when ripe.

The Swediſh Juniper has a natural tendency to grow to a greater height, and conſequently has more the appearance of a tree than the former. Sixteen or eighteen feet, however, is the higheſt it commonly grows to; and the plants raiſed from its ſeeds have, for the moſt part, a tendency to grow higher, and become more woody and branching. The leaves, flowers, and fruit grow in the ſame manner as the former, which ſhews it to be a variety only. Old Botaniſts mention it as a diſtinct ſpecies: Caſpar Bauhine aſſerts this, and calls one the Shrubby Juniper, and the other the Tree Juniper; he alſo mentions another ſort, which he calls the Leſſer Mountain Juniper, with a broader leaf and a larger fruit.

2. JUNIPERUS *(Oxycedrus)* foliis undique imbricatis obtuſis, ramis teretibus. *Juniper with obtuſe leaves every where lying over each other, and taper branches.* Juniperus major, baccâ rufeſcente. C. B. P. 489. *Greater Juniper with a browniſh berry. Spaniſh Juniper.*

This ſort grows rather higher than the Swediſh in ſome ſoils. It will be feathered from the bottom to the top, if left untouched from the firſt planting, or if not crouded with other trees. The leaves are awl-ſhaped, and finely ſpread open. They are very ſhort, ſharp-pointed, and give the tree a fine look. The flowers of this ſhrub are ſucceeded by large reddiſh berries, which are very beautiful when ripe.

3. JUNIPERUS *(Thurifera)* foliis quadrifariàm imbricatis acutis. Lin. Sp. 1471. *Juniper with awl-ſhaped acute leaves placed by fours, lying over each other.* Juniperus major baccâ cæruleâ. C. B. P. *Greater Juniper with blue berries.* Cedrus Hiſpanica procerior fructu maximo nigro. Tourn. Inſt. *Spaniſh Cedar.*

The Spaniſh Cedar grows plentifully in the country from whence it derives its name, and is itſelf a regular growing tree, riſing in a conical form, if the branches are untouched, to the height of thirty feet or more. The leaves are imbricated, and lie over each other four ways; they are acute, and of a fine green co-

2. Of Juniper we have three or four ſorts, Male, Female, Dwarf; whereof one is much taller and more fit for improvement. The wood is yellow, and being cut in March, ſweet as Cedar, whereof it is accounted a ſpurious kind; all of them difficult to remove with ſucceſs; nor proſper they being ſhaded at all or over-dripped. The Swediſh Juniper, now ſo frequent in our modiſh gardens, and ſhorn into pyramids, is but a taller and ſomewhat brighter ſort of the Vulgar.

3. I have raiſed them abundantly of their ſeeds, neither watering nor dunging the ſoil, which in two months will peep; and being governed like the Cypreſs, are apt for all the employments of that beautiful tree. To make it grow tall, prune and cleanſe it to the very ſtem; the male beſt. The diſcreet looſening of the earth about the roots alſo, makes it ſtrangely

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lour: From theſe properties only an idea of a fine tree may be had. The flowers are inſignificant to a common obſerver, but they are ſucceeded by berries which make a good ſhow when ripe; for they are very large, and of a fine black colour, and adorn the young brances in great plenty.

4. JUNIPERUS *(Lycia)* foliis ternis undique imbricatis ovatis obtuſis. Flor. Leyd. 90. *Juniper with oval blunt leaves, which every where lie over each other.* Cedrus, folio Cupreſſi, media majoribus baccis. C. B. P. 488. *Middle Cedar, with a Cypreſs leaf and larger berries.*

The Lycian Cedar grows naturally in the country ſo called, and is as common in Spain as the former ſort. It will riſe to the height of about twenty-five feet. The branches have naturally an upright poſition, and their bark is of a reddiſh hue. The leaves are every where imbricated, obtuſe, and of an oval figure. They reſemble thoſe of the Cypreſs, and are very beautiful. The flowers are ſucceeded by large oval berries, of a brown colour, and are produced in plenty from the ſides of the younger branches all over the tree.

5. JUNIPERUS *(Phœnicia)* foliis ternis obliteratis imbricatis obtuſis. Lin. Sp. 1471. *Juniper with leaves placed by threes, which are obliterate, obtuſe, and lying over each other.* Cedrus folio Cupreſſi major, fructu flaveſcente. C. B. P. *Greater Cedar with a Cypreſs leaf and yellowiſh fruit.*

The Phœnician Cedar ſeldom grows higher than twenty feet, and is a beautiful upright ſort, forming a kind of pyramid, if untouched, from the bottom. It has both ternate and imbricated leaves; the under ones grow by threes, and ſpread open; and the upper ones are obtuſe, and lie over each other like the Cypreſs. The flowers are produced from the ends of the branches; and the fruit that ſucceeds them is rather ſmall, and of a yellow colour. It is commonly called the

Book II. to prevent your expectations, by ſuddenly ſpreading into a buſh fit for a thouſand pretty employments; for, coming to be much unlike that which grows wild, and ſubject to the treading and cropping of cattle, &c. it may be formed into moſt beautiful and uſeful hedges. My late brother having formerly cut out of one only tree an arbour capable of receiving three perſons to ſit in; it was at my laſt meaſuring ſeven feet ſquare and eleven in height, and would certainly have been of a much greater altitude, and farther ſpreading, had it not continually been kept ſhorn: But what is moſt conſiderable, is the little time ſince it was planted, being then hardly ten years, and then it was brought out of the common, a ſlender buſh of

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Phœnician Cedar, though it is found growing naturally in moſt of the ſouthern parts of Europe.

6. JUNIPERUS *(Virginiana)* foliis ternis omnibus patentibus. *Juniper with leaves placed by threes, which are all of them ſpreading.* Juniperus Virginiana folio ubique Juniperino. Boerh. Ind. *Cedar of Virginia, or Red Cedar.*.

The Red Virginia Cedar is a tree of great uſe and beauty. Its growth is upright. The branches form a beautiful cone; and if left unſprigged, the tree will be feathered to the very baſe. It grows to near forty feet high; and the timber is valuable for many excellent uſes. It will continue ſound and uncorrupt for many ages, being poſſeſſed of a bitter reſin, which prevents the worms from attacking it. The wood may be converted into utenſils of moſt ſorts, as well as applied to a great part of the uſes to which the Cypreſs is adapted. It is remarkable, however, for being of a very brittle nature, and is therefore not proper to be introduced into buildings where any great weight is to be lodged. Nevertheleſs, in Virginia and Carolina, where they abound, theſe trees are uſed in ſtructures of all kinds, with this precaution; and the inhabitants prefer the timber for wainſcotting their rooms and building of veſſels. Thoſe who are deſirous of having variety of timber-trees in their plantations, will doubtleſs be inclined to allow this a place.

7. JUNIPERUS *(Bermudiana)* foliis inferioribus ternis, ſuperioribus quadrifariàm imbricatis. Mill. Dict. *Juniper with ſpreading under-leaves placed by threes, and the upper by fours, which lie cloſe over each other.* Juniperus Bermudiana. H. L. *Cedar of Bermudas.*

The Cedar of Bermudas is a very tender plant, and requires not only a dry warm ſoil, and a well-ſheltered ſituation, but open, mild winters, to make it continue through them; ſo that when a perſon is deſirous of having an extenſive collection, then, and then only, are theſe ſorts to be ſought after. When they are planted abroad in the warmeſt places, ſheds ſhould be made for them of boards well cloſed, and ſhould be at hand for the gardener to cover the plants with at the firſt

about two feet high. But I have experimented a proportionable improvement in my own garden, where I do mingle them with Cypreſs; and they would perfectly become their ſtations where they might enjoy the ſun, and may very properly be ſet where Cypreſs does not ſo well thrive, namely, in ſuch gardens and courts as are open to the eddy-winds, which indeed a little diſcolours our Junipers when they blow eaſterly towards the ſpring, but they conſtantly recover again; and beſides, the ſhrub is tonſile, and may be ſhorn into any form. I wonder Virgil ſhould condemn its ſhadow——*Juniperi gravis umbra*——I ſuſpect him miſreported.

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approach of froſty weather, and to uncover them at its departure. Theſe ſheds are to be enlarged as the trees advance in height; for though they will more peculiarly want protection when young, yet a ſevere froſt, with cutting black winds, will endanger the deſtroying very full-grown trees. Theſe ſheds may be made like the centinel-boxes, and muſt always be of a proportionable ſize to the tree. This ſpecies grows to be a large timber-tree in America; and we uſed to receive the wood from thence in greater plenty than we do at preſent. It is poſſeſſed of a very ſtrong odour, and rooms wainſcotted with it are much ſcented, which to many is agreeable, but not to all; though moſt perſons agree it renders the air wholeſome. We never muſt expect to raiſe this tree to anſwer any purpoſes in the timber-way; the moſt we may expect is a few only in our plantations, for variety and obſervation. It is obſervable, as theſe trees advance in growth, their branches become cornered, and their leaves ſuffer a change in their nature. At firſt they are narrow, ſharp-pointed, and produced by threes round the branches, ſpreading open in a pretty manner. The leaves afterwards grow ſhorter, and are produced by fours, without having any tendency to ſpread open. The flowers are produced nearly in the ſame manner as the Virginian kinds, and are ſucceeded by purpliſh berries.

8. JUNIPERUS *(Barbadenſis)* foliis omnibus quadrifariàm imbricatis; junioribus ovatis, ſenioribus acutis. Prod. Leyd. 90. *Juniper with all the leaves placed by fours, lying over each other, the young being oval, the older acute.* Juniperus maxima cupreſſi folio minimo, cortice exteriore in tenues philyras ſpirales ductili. Sloan. Cat. Jam. 128. *Greateſt Juniper with the leaſt Cypreſs leaf, and the outer bark ſplitting off in thin ductile pieces.* Commonly called *Jamaica Berry-bearing Cedar.*

This Cedar is a very large timber-tree in Jamaica and other iſlands where it grows naturally, and is much ſought after for the building of ſhips, &c. The branches are ſpreading, many are cornered, and their bark is rough, and of a brown colour. The leaves grow by fours, and lie over each other. They are ſmall; the older leaves are ſharp-pointed, but the younger are more oval; and many are imbricated in a manner like the Cypreſs. Neither the male nor female flowers, which

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3. The berries afford, beſides a tolerable pepper, one of the moſt univerſal remedies in the world to our crazy Foreſter. Being ſwallowed only, they inſtantly appeaſe the wind-cholic; and, in decoction, they are moſt ſovereign againſt an inveterate cough. They are of rare effect being ſteeped in beer; and in ſome northern countries they uſe a decoction of the berries as we do coffee and tea. The water is a moſt ſingular ſpecific againſt the gravel in the reins; but all is comprehended in the virtue of the theriacle, or electuary, which I have often made for my poor neighbours, and may well be termed the foreſter's panacea againſt the ſtone, rheum, pthyſic, dropſy, jaundice, inward impoſthumes, nay, palſy, gout, and the plague

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are found on different plants, make any figure; and they are ſucceeded by a ſmall browniſh berry. This is a very tender plant, though if it has a ſhed like the other, it may be nurſed until it becomes a large tree. In very hard froſts, care muſt be taken to lay plenty of litter, &c. round the bottom of the ſhed (which muſt indeed be obſerved for both the ſorts) to keep the froſt from penetrating into the ground. The ſhed muſt be always taken off, and the litter kept from the ſtem, on the firſt return of fine open weather.

9. JUNIPERUS *(Sabina)* foliis oppoſitis erectis decurrentibus, ramis patulis. *Juniper with oppoſite, erect, running leaves, and ſpreading branches.* Sabina folio Cupreſſi. B. P. 487. *Savin with a Cypreſs-leaf; or Common Savin.*

Of this ſpecies there are three ſorts: 1. Spreading Savin; 2. Upright Savin; 3. Striped Savin.

The Spreading Savin is a low-ſpreading ſhrub; the branches have a natural tendency to grow horizontally, or nearly ſo; ſo that it muſt be ranked amongſt the loweſt growing ſhrubs; inſomuch that unleſs it is planted againſt a wall, or ſupported in an upright poſition, we ſeldom have it higher than two feet.—— When it is to be planted and left to Nature, room muſt be allowed for its ſpreading; for it will occupy a circle of more than two or three yards diameter, and will choak any other leſs-powerful ſhrub that is placed too near it. The bark on the older ſhoots is of a light-brown colour; but on the younger, which are covered with leaves running into each other, it is of as fine a green as any ſhrub whatever. Theſe leaves are erect, and acute-pointed. They are placed oppoſite, and grow a little like thoſe of the French Tamariſk. This ſhrub ſeldom produces flowers or berries; but when any berries do appear, they are ſmall and of a blueiſh colour. It deſerves a place amongſt low-growing Evergreens, on account of the fine ſtrong green of its leaves both in winter and ſummer; but it is valuable for nothing elſe; for it produces neither ornamental flowers nor fruit, and is poſſeſſed of a very ſtrong ſmell; inſomuch that when the branches and leaves are accidentally ſhook by a perſon's paſſing by, the whole atmoſphere is immediately filled with a fœtid ſcent highly offenſive and diſagreeable. The juice of Savin, mixed

itſelf, taken like Venice Treacle. Of the extracted oil, with that of nuts, is made an excellent good varniſh for pictures, wood-work, and to preſerve poliſhed iron from the ruſt. The gum is good to rub on parchment or paper to make it bear ink: And the coals, which are made of the wood, endure the longeſt of any; ſo as live embers, after being a year covered, have been found in the aſhes. See St. Hierom ad Fabiolam, upon that expreſſion, Pſal. cxx. 4. If it arrive to full growth, ſpits and ſpoons, imparting a grateful reliſh, and very wholeſome where they are uſed, are made of this wood, being well dried and ſeaſoned: And the very

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with milk and honey, is ſaid to be good to expel worms from children; as well as, without that mixture, to deſtroy thoſe in horſes, for which purpoſe it is ſtrongly recommended.

The Upright Savin is a delightful tree; it will grow to be twelve or fourteen feet high. The branches are numerous and ſlender, and give the tree a genteel air. The leaves are nearly of the ſame nature with the other, though they are of a darker green. The flowers are produced in plenty, but make no ſhow; and they are ſucceeded by berries in ſuch plenty as to cauſe a good effect. The upright tendency of this tree, with the very dark green colour of the leaves, which cauſes a good contraſt with others that are lighter, together with its not being poſſeſſed of that ſtrong diſagreeable ſcent of the other ſort, makes it a valuable ſhrub for Evergreen plantations.

The Striped Savin has not that tendency to ſpread like the Common, neither does it grow quite ſo upright as the Berry-bearing Savin. It is a fine plant, and at preſent is rather ſcarce. The ends of ſeveral of the young ſhoots are of a fine cream-colour; nay, all the ſmaller branches appear often of that colour, and at a diſtance have the appearance of flowers growing on the tree. To thoſe who are fond of variegated plants, this ſhrub has both beauty and ſcarcity to recommend it.

The Juniper is of the claſs and order *Dioecia Monadelphia.*

Having given a general account of the various ſpecies of this genus of plants, I ſhall now conſider their propagation. They are raiſed from ſeeds which muſt be ſown as ſoon as ripe, for when they are kept until ſpring, they will not come up until the ſecond year. The ground in which the ſeeds of the *hardy* ſorts are ſown, ſhould be freſh and light, but not dunged: being well dug and formed into beds, ſow your ſeeds pretty thick, and ſift ſome earth over them about half an inch thick; the beds will require no farther care than only to keep them clear from weeds; and toward the middle or latter end of April, you will find ſome of the plants appear above ground, though, perhaps, the greateſt part of them may lie till the ſpring following before they come up; therefore you ſhould carefully clear the beds from weeds, and in very dry weather refreſh them with ſome water, which will greatly promote the growth of

Book II. chips render a wholeſome perfume within doors, as well as the duſty bloſſoms in ſpring without, and excellent within to correct the air, and expel infection; for which purpoſe the wood ſhould be cut about May, and the raſures well dried.

4. And ſince we now mention pepper, it is by the moſt prudent and princely care of his late Majeſty Charles II. that I am aſſured of a late ſolemn act of council, enjoining the preſerving of that incomparable ſpice, which comes to us from Jamaica under that denomination, tho' in truth it

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thoſe plants which are up, and alſo cauſe the other ſeeds to vegetate; but if the beds in which theſe ſeeds are ſown are much expoſed to the ſun, they ſhould be ſhaded with mats in the day; for when the plants come firſt up, they will not bear too much heat. In theſe beds they ſhould remain till the ſecond autumn, when you muſt prepare ſome beds to tranſplant them into, which ſhould alſo be of light, freſh, undunged ſoil; and having well dug and cleanſed the ground from all noxious weeds and roots, you ſhould make it level; and then in the beginning of October, which is the proper ſeaſon for removing theſe plants, raiſe up the young plants with a trowel, preſerving as much earth as poſſible to their roots, and plant them into beds about five or ſix inches aſunder each way, giving them ſome water to ſettle the earth to their roots; and if it ſhould prove very dry weather, you may lay a little mulch upon the ſurface of the ground round their roots, which will be of great ſervice to the plants: But as many of the ſeeds will be yet left in the ground where they were ſown, ſo the beds ſhould not be diſturbed too much in taking up the plants; for I have known a bed ſown with theſe berries, which has ſupplied plants for three years drawing, ſome of the berries having lain ſo long in the ground before they ſprouted; therefore the ſurface of the beds ſhould be kept level, and conſtantly clean from weeds.

The plants may remain two years in the new beds, obſerving to keep them clear from weeds; in the ſpring you ſhould ſtir the ground gently between them, that their roots may with greater eaſe ſtrike into it; after which time they ſhould be tranſplanted, either into a nurſery, at the diſtance of three feet row from row, and eighteen inches aſunder in the rows, or into the places where they are to remain for good. The beſt ſeaſon to tranſplant them (as I before obſerved) is the beginning of October, when you ſhould take them up carefully, preſerving a ball of earth to their roots; and when planted, their roots ſhould be mulched; all which, if carefully attended to, as alſo obſerving to refreſh them with water in very dry weather until they have taken new root, will preſerve them from the danger of not growing; and they being extreme hardy in reſpect to cold, will defy the ſevereſt of our winters, provided they are not planted in a moiſt or rich ſoil.

In order to have theſe trees aſpire in height, their under branches ſhould be taken off, eſpecially where they are inclined to grow ſtrong, but they muſt not be kept too cloſely pruned, which would retard their growth; for all theſe Evergreen trees do more

be a mixture of ſo many aromatics in one, that it might as well have been called All-ſpice, holding a near alliance to Cinnamon, Nutmeg, and Mace. And that there is not only prohibited the deſtruction of theſe trees, for it ſeems ſome prodigals uſed to cut them down for the more eaſy gathering, but order taken likewiſe for their propagation, and that aſſays and ſamples be from time to time ſent over, what other fruits, trees, gums, and vegetables may there be found; and which I prognoſtic will at laſt alſo incite planters there to think of procuring Cinnamon, Cloves, and Nutmeg-trees indeed, from the Eaſt-Indies, and what other uſeful curio-

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or leſs abound with a reſinous juice, which in hot weather is very apt to flow out from ſuch places as are wounded; ſo that it will not be adviſeable to take off too many branches at once, which would make ſo many wounds, from which their ſap in hot weather would flow in ſuch plenty, as to render the trees weak and unhealthy.

The two Virginian Cedars grow to a prodigious height, and in their native country afford excellent timber for many uſes; but with us there are very few which are above thirty-five or forty feet high, though there can be no doubt of their growing larger; for they thrive very faſt after the three firſt years, and reſiſt the ſharpeſt froſt of our climate exceeding well, and are very apt to grow ſtraight and regular, provided they are not ſuffered to ſhoot out too much at bottom.

Theſe are alſo propagated by ſeeds, which muſt be procured from Virginia or Carolina, (for they rarely produce ripe ſeeds in England) and ſown as directed for the other Junipers; but as this ſeed cannot be procured in England till ſpring, ſo when ſown at that ſeaſon, it remains in the ground until the ſucceeding ſpring before the plants appear; therefore you muſt obſerve to keep the beds clear from weeds, and not ſuffer the ſeeds to be diſturbed, which is often the fault of ſome impatient people, who think, becauſe the plants do not riſe the firſt year, that they will never come up, and ſo dig up the ground again, whereby the ſeeds are buried; but if they are ſuffered to remain, they ſeldom fail to grow, though ſometimes it is two years after ſowing before they come up. When the plants come up they muſt be carefully weeded, and in dry weather ſhould be refreſhed with water, which will greatly forward their growth; and the autumn following there ſhould be a little rotten tan ſtrewed upon them, to keep out the froſt. In this bed the plants may remain till they have had two years growth, then they ſhould be tranſplanted into other beds, as directed for the other ſorts, obſerving to preſerve a ball of earth to their roots; and after they are planted, if the ſeaſon proves dry, they muſt be carefully watered, and the ſurface of the ground covered with mulch, to prevent the ſun and wind from entering the earth to dry their fibres; but they ſhould not be too much watered, which often proves injurious to theſe trees, by rotting their tender fibres ſoon after they are produced.

In theſe beds they may remain two years, obſerving to keep them clear from weeds; and in winter you ſhould lay a little freſh mulch upon the ſurface of the ground round their roots, which will prevent the froſt from penetrating to them, and effectually

Book II. ſities do not approach our northern bear, and to plant them in Jamaica, and other of the weſtern iſlands, as a more ſafe and frugal expedient to humble our emulous neighbours, ſince there is nothing in their ſituation, or defect of nature's benignity, which ought in the leaſt to diſcourage us. And what if ſome of the trees of thoſe countries, eſpecially ſuch as aſpire to be timber, and may be of improvement amongſt us, were more frequently brought to us likewiſe here in England: Since we daily find how many rare exotics and ſtrangers, with little care, become endenizoned, and contented to live amongſt us, as may be ſeen in the Platanus, Conſtantinople Cheſnut, the greater Glandiferous Ilex, Cork, Nux Veſicaria, (which is an hard wood fit for the turner) the Styrax, Bead-tree, the famous Lotus, Virginian Acacia, Guaiacum Pa-

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preſerve them; for while the plants are ſo young, they are liable to be injured by hard froſts, when too much expoſed thereto; but when they have attained a greater ſtrength, they will reſiſt the ſevereſt colds.

After two years, they ſhould either be removed into the nurſery, (as was directed for the common Juniper) or tranſplanted where they are deſigned to remain, obſerving always to take them up carefully, otherways they are ſubject to fail upon tranſplanting; as alſo to mulch the ground, and water them as before directed, until they have taken root; after which they will require no farther care, than only to keep the ground clear about their roots, and to prune up their ſide-branches to make them aſpire in height.

The ſoil in which you plant theſe trees ſhould be freſh and light, but muſt not be dunged, eſpecially at the time when they are planted; for dung is very hurtful to them, if it be not quite rotted to mould; therefore the mulch which is laid upon the ſurface of the ground ſhould not be dung, but rather ſome old tanners' bark or ſea-coal aſhes, which will prevent the froſt from penetrating deep into the ground.

Theſe trees being thus managed, will, in a few years, riſe to a conſiderable ſtature, and by the variety of their evergreen leaves and manner of growth, will greatly add to the beauty of all plantations, if rightly diſpoſed, which indeed is what we ſeldom obſerve in any of the Engliſh gardens or wilderneſſes; for there are few people who conſider the different growths of the ſeveral trees with which they compoſe ſuch plantations, ſo as to place the talleſt growing trees the backwardeſt from ſight, and the next degree to ſucceed them, and ſo gradually diminiſhing till we come to the common Juniper, and others of the ſame growth. In this manner all the trees will be ſeen, and the gradual declivity of their tops will appear like a verdant ſlope, and be much more agreeable to the ſight, as alſo more advantageous to the growth of the trees, than to place ſhrubs of humble growth near ſuch plants as will grow to the firſt magnitude, whereby the ſhrub is not only hid from ſight, but will be over-ſhadowed and deſtroyed; nor can the diſtance which each tree requires, be ſo juſtly proportioned any other way; for in this diſtribution, the largeſt trees being ſeparated by themſelves, may be placed at a due diſtance; and thoſe of a middling growth ſucceeding, may be

tavinum, Paliurus, Cypreſs, Pines, Fir, and ſundry others, which grow already in our gardens, expoſed to the weather; and ſo doubtleſs would many more. So judiciouſly obſerved is that of the learned author of the Hiſtory of the Royal Society, part iii. ſect. xxviii. "That whatever attempts of this nature have ſucceeded, they have redounded to the great "advantage of the Undertakers. The Orange of China being of late "brought into Portugal, has drawn a great revenue every year from Lon- "don alone. The Vine of the Rhine, taking root in the Canaries, has "produced a far more delicious juice, and has made the rocks, and ſun- "burnt aſhes of thoſe iſlands, one of the richeſt ſpots of ground in the "world. And I will alſo inſtance in that which is now in a good for- "wardneſs; Virginia has already given ſilk for the cloathing of our King; "and it may happen hereafter to give cloaths to a great part of Europe,

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accordingly allowed ſufficient room; and the ſmaller, which are next the ſight, being placed much cloſer, will hide the naked ſtems of the larger trees, and produce a moſt agreeable effect.

The Bermudas Cedar being a native of that iſland, and alſo of the Bahama iſlands, is much tenderer than either of the former ſorts, except that of Jamaica, ſo is not likely to thrive well in this country; for although many of theſe plants have lived ſeveral years in the open air in England, yet whenever a ſevere winter happens, it either kills them, or ſo much defaces them, that they do not recover their verdure for ſome years.

Theſe plants are propagated by ſeeds in the ſame manner as the former, with only this difference, that theſe ſhould be ſown in pots or tubs of earth, that they may be removed into ſhelter in the winter time, otherwiſe the young plants are often hurt by hard froſts; but they will require no more care than only to be placed under a common hot-bed frame, where the glaſſes may be conſtantly kept off in mild weather, when they cannot have too much free air, and only covered in hard froſts. Theſe ſeeds conſtantly remain in the ground until the ſecond year before they come up, therefore the earth in the pots ſhould not be diſturbed; and in the ſummer time they ſhould be placed in the ſhade, to prevent the earth from drying too faſt; and in very dry weather they ſhould be often watered, but do not give too much water to them at once, which would rot the ſeeds.

The ſpring following, when the young plants come up, they muſt be carefully cleared from weeds, and in dry weather refreſhed with water; but ſhould ſtand, during the ſummer ſeaſon, in a place defended from ſtrong winds; and in winter muſt be placed under frames, where they may be covered in hard froſty weather, but muſt have open air when the weather is mild. In April following you ſhould tranſplant them each into a ſmall pot filled with freſh light earth, being careful to raiſe them up with a ball of earth to their roots; and when they are planted, you ſhould water them, to

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" and be a vaſt treaſure to our Kings. If the ſilk-worms ſhall thrive there, " of which there ſeems to be no doubt, the profit will be inexpreſſible. " We may gueſs at it, by conſidering what numbers of Caravans, and " how many great cities in Perſia are maintained by that manufacture " alone, and what mighty cuſtoms it yearly brings unto the Sophi's reve- " nue." Thus he. To which we might add, that not only the China Orange mentioned by the Doctor, but the whole race of Orange trees, were ſtrangers in Italy, and unknown to Rome; nor grew they nearer than Perſia, whence firſt they travelled into Greece, as Athenæus tells us. But to return to that of China, and give ſome account of its propagation in Europe: The firſt was ſent for a preſent to the old Conde Mellor, then Prime Miniſter to the King of Portugal; but of that whole caſe they came to Liſbon in, there was but one only plant which eſcaped the being

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ſettle the earth to the roots; then place the pots in a warm ſituation, where they may be defended from ſun and wind: but if you will plunge the pots into a moderate hot-bed, it will greatly promote their taking new root; however, you muſt carefully defend them from the great heat of the ſun, which is injurious to them when freſh removed; but when they have taken root, you may expoſe them by degrees to the open air. If you ſuffer the pots to remain plunged all the ſummer, it will preſerve the earth therein from drying ſo faſt as it would do, if they were ſet upon the ground.

In October you ſhould again remove theſe plants into ſhelter, or elſe plunge the pots into the ground under a warm hedge, where they may be protected from the cold north and eaſt winds; and in the ſpring following you muſt ſhift the plants into pots of a ſize larger, taking away ſome of the earth from the outſide of the ball, and adding ſome freſh, which will promote their growth; and ſo continue to manage them as was before directed, until you plant them out into the places where they are deſigned to remain; which ſhould not be done till they are four or five years old, by which time they will be ſtrong enough to bear the cold of our common winters.

The reaſon for my directing theſe plants to be preſerved in pots until they are planted out for good is, becauſe they are difficult to tranſplant, and being tender will require ſome ſhelter while young; and whoever obſerves the method here laid down, will find the plants ſo managed to gain two years growth in ſix, from thoſe raiſed in the open air, and be in leſs danger of being deſtroyed; and as the trouble and expence in raiſing them this way is not great, ſo it is worth practiſing, ſince in a few years the trees will recompenſe the trouble.

The timber of this tree is of a reddiſh colour, and very ſweet, and is commonly known in England by the name of Cedar Wood; tho' there are divers ſorts of wood called by that name, which come from very different trees, eſpecially in the Weſt-Indies, where there are ſeveral trees of very different appearances and genera, which have that appellation. It is this wood which is uſed for pencils, as alſo to wainſcot

ſo ſpoiled and tainted, that with great care it hardly recovered, to be ſince become the parent and progenitor of all thoſe flouriſhing trees of that name, cultivated by our gardeners, though not without ſenſibly degenerating. Receiving this account from the illuſtrious ſon of the Conde, (ſucceſſor in title and favour) upon his being recalled, (then an exile at our court, where I had the honour to be known to him) I thought fit to mention it in this place, for an inſtance of what the induſtry we have recommended would, queſtionleſs, in leſs than half an age, produce of wonders, by introduction, if not of quite different, yet of better kinds; and ſuch variety for pulchritude and ſweetneſs, that when, by ſome princely example, our late pride, effeminacy, and luxury (which has, to our vaſt charges, excluded all the ornaments of timber, &c. to give place to hangings, embroideries, and foreign leather) ſhall be put out of counte-

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rooms, and make ſtair-caſes, it enduring longer ſound than moſt other ſorts of timber, which, perhaps, may be owing to ſome extreme bitter taſte in the reſin, with which the tree abounds; for it is very remarkable, that the worms do not eat the bottoms of the veſſels built with this wood, as they do thoſe built with Oak; ſo that the veſſels built with Cedar are much preferable to thoſe built with any other ſort of timber, for the uſe of the Weſt-India trade; but they are not fit for ſhips of war, the wood being ſo brittle as to ſplit to pieces with a cannon ball.

The Jamaica Juniper is more impatient of cold than the Bermudas; it will not live through the winter in the open air in England, ſo the plants muſt be preſerved in pots, and houſed in the winter. This is propagated by ſeeds, in the ſame way as the Bermudas Cedar; but if the pots are plunged into a moderate hot-bed the ſecond ſpring after the ſeeds are ſown, it will bring up the plants ſooner, and they will have more time to get ſtrength before winter.

All the other ſorts are hardy enough to live in the open air, ſo are very well worth propagating, as they will add to the variety of Evergreen plantations; ſome of the ſorts will riſe to a very conſiderable height, ſo may prove to be uſeful timber, and may be adapted to ſuch ſoils as will not ſuit many other trees.

The Common Savin may be encreaſed by ſlips, which, if planted almoſt at any time, or any how, will grow. The Upright Savin alſo is to be encreaſed by ſlips planted in moiſt weather, in Auguſt, and kept ſhaded and watered in dry weather afterwards. This is the beſt way of treating cuttings of the Upright Savin, tho' they will often grow if planted at any time, either in winter or ſummer. The Striped Savin alſo is to be encreaſed this way; though care muſt be always uſed to take off thoſe branches that are moſt beautifully variegated, and ſuch as are entirely of a cream-colour; for this will be the moſt probable method of continuing it in its variegated beauties. The Savin is alſo to be raiſed by berries; and by theſe the moſt upright and beſt plants are produced.

Book II. nance, we may hope to ſee a new face of things for the encouragement of planters, the more immediate work of God's hands, and the natural, wholeſome, and antient uſe of timber, for the more laſting occaſions, and furniture of our dwellings. And though I do not ſpeak all this for the ſake of joined-ſtools, benches, cup-boards, maſſy tables, and gigantic bedſteads, the hoſpitable utenſils of our forefathers! yet I would be glad to encourage the carpenter and the joiner, and rejoice to ſee that their work and ſkill do daily improve; and that by the example and application of his Majeſty's Univerſities and Royal Society, the reſtoration and improvement of ſhipping and mathematical and mechanical arts, the uſe of timber grows daily in more reputation. And it were well if great perſons might only be indulged to enrich and adorn their palaces with tapeſtry, damaſk, velvet, and Perſian furniture, whilſt by ſome wholeſome ſumptuary laws, the univerſal exceſs of thoſe coſtly and luxurious moveables were prohibited meaner men, for divers politic conſiderations and reaſons, which it were eaſy to produce; but by a leſs influence than ſeverer laws, it will be very difficult, if not altogether impoſſible, to recover ourſelves from a ſoftneſs and vanity, which will in time not only effeminate, but undo the nation.

CYPRESS*.

1. This is either the Sative or Garden-tree, the moſt pyramidal and beautiful; or that which is called the male, though ſomewhat prepoſterouſly, which bears the ſmall cones, but is of a more extravagant ſhape. Should we reaſon only from our common experience, even the Cypreſs-

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* Of this genus there are four ſpecies.

1. CUPRESSUS *(Sempervirens)* foliis imbricatis, frondibus quadrangulis. Lin. Sp. Pl. 1422. Cupreſſus meta in faſtigium convoluta. ſ. Femina. Tourn. Inſt. 587. Cupreſſus, C. B. P. 488. *Female*, or *Common Upright Cypreſs*

This tree is very common in moſt of our old gardens, but at preſent is rather neglected. It adds a conſiderable beauty to wilderneſſes and clumps of Evergreens, and is reported to be valuable on account of its wood. There is a variety of this tree intitled, by Tournefort, *Cupreſſus ramos extra ſe ſpargens ſ. mas. Inſt.* 587. This is commonly called the *Male Spreading Cypreſs*, and is the moſt common timber in ſome parts of the Levant. It is conſiderably larger than the Upright ſort. If planted upon a warm gravelly ſoil it will proſper wonderfully; though not ſo finely ſhaped as the female, it makes up for that defect by its vigorous growth and ſtrength, reſiſting all weathers. It is very proper to intermix with Evergreens of a ſecond ſize next to Pines, to form clumps; in which claſs it will

tree was, but within a few years paſt, reputed ſo tender and nice a plant, that it was cultivated with the greateſt care, and to be found only amongſt the curious; whereas we ſee it now in every garden, riſing to as goodly a bulk and ſtature as moſt which you ſhall find even in Italy itſelf: For ſuch I remember to have once ſeen in his late Majeſty's gardens at Theobalds, before that princely ſeat was demoliſhed. I ſay, if we did argue from this topic, methinks it ſhould rather encourage our countrymen to add yet to their plantations other foreign and uſeful trees, and not in the leaſt deter them, becauſe many of them are not as yet become endenizoned amongſt us: But of this I have ſaid enough, and yet cannot but ſtill repeat it.

2. We read that the Peach was at firſt accounted ſo tender and delicate a tree, as that it was believed to thrive only in Perſia; and even in the

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keep pace with the trees of the ſame line, and be very handſome: Beſides, the wood of this tree is very valuable, when grown to a ſize fit for planks.——In the iſlands of the Archipelago, as Mr. Evelyn informs us, it was cuſtomary, upon the birth of a daughter, to plant a *Cupreſſetum*, or grove of Cypreſs-trees, to be given her for a portion. Hence every plantation of this kind was called *Dos Filiæ*, or a Daughter's Dower. Were Gentlemen in this country to imitate this practice with other trees, they might provide handſome fortunes for their younger children without incumbering their eſtates.

2. CUPRESSUS *(Diſticha)* foliis diſtichis patentibus. Hort. Cliff. 459. Cupreſſus Americana. Cat. Car. 1. Cupreſſus Virginiana, foliis acaciæ deciduis Hort. Amſt. i. p. 113. *The Deciduous Cypreſs.*

This kind of Cypreſs, if ſtationed in a place ſuitable to its nature, will grow to the height of ſixty feet. It is very hardy in reſpect to cold; and a ſhare of the moiſteſt part of the plantation muſt be allotted it. In Virginia and ſeveral parts of America, where this tree is a native, it is a real aquatic, being found growing to a very large ſize in places wholly covered with water; and with us, if planted in watery places, by the edges of rivers, ponds, ſprings, &c. it will be more luxuriant, and will proportionally ariſe to a greater height and bulk than if planted in a dry ſoil. This tree in the ſummer has a little the reſemblance of an Evergreen, and the leaves have a pleaſing effect, appearing in ſome reſpects like ſome ſorts of the Acacias; and theſe are the chief inducements for its admiſſion into the pleaſure-ground.

3. CUPRESSUS *(Thyoides)* foliis imbricatis, frondibus ancipitibus. Lin. Sp. Pl. 1422. *Cypreſs with imbricated leaves, and branches ſtanding two ways.* Cupreſſus nana Mari-

Book II. days of Galen it grew no nearer than Egypt, of all the Roman Provinces, but was not ſeen in the city till about thirty years before Pliny's time; whereas there is now hardly a more common and univerſal tree in Europe. Thus likewiſe the Avellana travelled from Pontus, in Aſia, into Greece, and from thence into Italy, to the city of Abellino in Campania. I might affirm the ſame of our Damaſco Plum, Quince, Medlar, Fig, and moſt ordinary Pears, as well as of ſeveral other peregrine fruit-bearing trees, and others; for even the very Damaſk Roſe itſelf (as my Lord Bacon tells us, Cent. ii. Exp. 659.) is little more than an hundred years old in England: Methinks this ſhould be of wonderful incitement. It was ſix hundred and eighty years after the foundation of Rome, before Italy had taſted a Cherry of their own, which being then brought thither out of Pontus (as the

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ana, fructu cærulèo parvo. Pluk. Mant. 61. *Dwarf Maryland Cypreſs with a ſmall blue fruit.*

The branches of this tree are garniſhed with flat evergreen leaves, reſembling thoſe of the Arbor Vitæ; and the cones are no larger than the berries of the Juniper, from which they are not eaſily diſtinguiſhed at a little diſtance; but upon cloſely viewing they are perfect cones, having many cells like thoſe of the common Cypreſs. If theſe trees are planted in a moiſt ſtrong ſoil, they make very great progreſs, and may, in ſuch ſituations, become profitable for timber; but however this tree may ſucceed for timber, yet it will be a great ornament to large plantations of evergreen trees, eſpecially in ſuch places where there is naturally a proper ſoil for them; becauſe, in ſuch ſituations, there are not many ſorts of Evergreen trees which thrive well, eſpecially in cold places; and by increaſing the number of theſe Evergreens, we add to the beauty of our gardens and plantations.

4. Cupressus *(Juniperoides)* foliis oppoſitis decuſſatis ſubulatis patulis. Lin. Sp. Plant. 1422. Cupreſſus foliis linearibus ſimplicibus cruciatem poſitis. Mill. Dict. *Cypreſs with narrow ſingle leaves placed croſsways. The Cape Cypreſs.*

The branches of this ſpecies are numerous, ſlender, and ſpread themſelves all round. The leaves are narrow, awl-ſhaped, about an inch long, of a light-green colour, and grow oppoſite to each other on the branches. The flowers come out from the ſides of the branches like common Cypreſs, and they are ſucceeded by black fruit; but the ſeeds never ripen in England.

The Cypreſs, in the Linnæan ſyſtem, belongs to the claſs and order *Monoecia Monodelphia.*

The manner of propagating the common Cypreſs is as follows: A warm border, or well-ſheltered bed, ſhould be prepared for the purpoſe, after having been well worked, turned over, and mellowed by the froſts all winter. The ſoil of this border, or bed,

above-mentioned Filberts were) did, after one hundred and twenty years, travel *ad ultimos Britannos.* CHAP. III.

3. We had our firſt Myrtils out of Greece, and Cypreſs from Crete, which was yet a mere ſtranger in Italy, as Pliny reports, and moſt difficult to be raiſed; which made Cato to write more concerning the culture of it than of any other tree: Notwithſtanding we have in this country of ours no leſs than three ſorts, which are all of them eaſily propagated, and proſper very well if they are rightly ordered; and therefore I ſhall not omit to diſcloſe one ſecret, as well to confute a popular error, as for the inſtruction of our gardeners.

4. The tradition is, that the Cypreſs, being a ſymbol of mortality, (they ſhould ſay of the contrary) is never to be cut for fear of killing it. This makes them to impale and wind them about like ſo many Ægyptian mummies; by which means the inward parts of the tree being heated, for

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ſhould be ſandy; and if it is not naturally ſo, ſome drift-ſand may be brought to mix with it, and worked all over the bed, at leaſt ſix inches deep. Having the border prepared, the mould being ſmooth and fine, let a ſmall part, ſufficient to cover the ſeeds, be taken out, and then let the bed be raked ſmooth and fine. After this, ſow the ſeeds all over it moderately thin; for if they are ſown too thick the roots get matted together, ſo that the plants cannot be removed out of the ſeed-bed into the nurſery, without great danger. The ſeeds being now ſown regularly over the bed, riddle the mould that was taken out, over them, not quite half an inch thick. The beginning of March is the beſt time for this work; and by the beginning of May, if the ſeeds were good, the plants will come up. If the month of April ſhould prove very dry, as it often happens, the beds may have now and then a gentle watering, which will help to bring the plants up. After they have come up, if the ſummer ſhould not prove very dry, they will require little watering; and even in the greateſt drought twice a week will be ſufficient for them, provided it be done in the evenings. This is the only care they will require the firſt ſummer, except being kept clean from weeds. If the place where they are ſown be tolerably well ſheltered, they will ſtand the winter very well, though it ſhould prove ſevere, as I have many times experienced; but where the ſituation is not well ſheltered by plantations, to break the violence of the froſty black winds, they muſt be ſcreened, otherwiſe many will be loſt. It is the black froſts, attended by high winds, which deſtroy theſe plants; ſo that where there is not ſhelter enough to break their edge, the beds ſhould be hooped over, and covered with mats during that ſevere weather.

The enſuing ſummer the plants may remain undiſturbed, and they will require neither watering, nor farther care, except weeding. The ſpring following, being then two

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want of air and refreſhment, it never arrives to any perfection, but is exceedingly troubleſome and chargeable to maintain; whereas, indeed, there is not a more tonſile and governable plant in nature; for the Cypreſs may be cut to the very roots, and yet ſpring afreſh, as it does conſtantly in Candy; if not yielding ſuckers, as Bellonius affirms, I rather think it is produced by the ſeeds, which the mother-trees ſhed at the motion of the ſtem in the felling: And this we find was the huſbandry in the Iſle of Ænaria, where they uſed to fell it for copſe. For the Cypreſs being raiſed in the nurſery from ſeeds ſown in September, or rather March, and within two years after tranſplanted, ſhould at two years ſtanding more, have the maſter-ſtem of the middle ſhaft cut off ſome hand-breadths below the ſummit; the ſides and ſmaller ſprigs ſhorn into a conic or pyramidal form, and ſo kept clipped from April to September, as oft as there is occaſion; and by this regimen they will grow furniſhed to the foot, and become the moſt beautiful trees in the world, without binding or ſtake; ſtill remembering to abate the middle ſtem, and to bring up the collateral

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years old, they ſhould be ſet out in the nurſery, exactly at two feet ſquare. In taking them out of the ſeed-bed, ſome earth ſhould be taken with the roots. The latter end of March is the moſt proper time for this work; and if the weather ſhould prove dry and cold, as it often happens, the March winds blowing, the work muſt be deferred till rainy or cloudy weather; for without theſe precautions you will find this a difficult plant to remove. After they are planted out into the nurſery they may be now and then watered in dry weather, and kept clean from weeds; thus they may ſtand till they are of a ſufficient ſize to be planted out for good.

The ground intended for a *Cupreſſetum* may the preceding year bear a crop of grain, and the winter before it is planted ſhould be plowed with a ſtrong plow, to deſtroy the weeds, and lay the beſt ſoil downwards.

After this, holes ſhould be made all over it at two yards diſtance. The plants muſt be taken out of the nurſery with as much mould to the roots as poſſible, and carefully planted in theſe holes. If the plants are deſigned for timber, when they get too cloſe they ought to be proportionably thinned; and ſhould undergo a ſecond thinning as often as they touch each other, till they arrive at their full ſize.

With regard to the Small Blue-berried and Cape Cypreſs, the ſeeds ſhould be ſown in pots or boxes. We receive them from abroad: They are very ſmall, and ſeldom come up before the ſecond ſpring; ſo that there will be leſs danger of their being loſt if they are ſown in pots or boxes, which may be ſet in the ſhade in ſummer, and removed into well-ſheltered places during the winter. In the ſpring the plants will come up; and after that the Blue-berried Cypreſs may have the ſame treatment as the young ſeedlings of the common ſort. With reſpect to the Cape Cypreſs, the plants muſt be ſet in pots, to be houſed in winter, until they are grown to be a yard high. When

branches in its ſtead, to what altitude you pleaſe: But when I ſpeak of ſhortening the middle ſhoot, I do not intend the dwarfing of it; and therefore it muſt be done diſcreetly, ſo as it may not over haſtily advance, till the foot thereof be perfectly furniſhed. But there is likewiſe another, no leſs commendable expedient, to dreſs this tree with all the former advantages; if ſparing the ſhaft altogether, you diligently cut away all the forked branches, reſerving only ſuch as radiate directly from the body, which being ſhorn, and clipt in due ſeaſon, will render the tree very beautiful; and though more ſubject to obey the ſhaking winds, yet the natural ſpring of it does immediately redreſs it, without the leaſt diſcompoſure; and this is a ſecret worth the learning of gardeners, who ſubject themſelves to the trouble of ſtakes and binding, which is very inconvenient. Thus

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they are turned out into the open air, they ſhould have a dry, warm ſoil, and a well-ſheltered place, and even then we cannot enſure their ſafety.

The Cypreſs is a native of Crete; and Theophraſtus informs us that it grows ſpontaneouſly upon mount Ida. Virgil properly calls it the Idæan Cypreſs:

——————— nec Idæis Cupariſſis. GEORG. ii.

Branches of Cypreſs uſed antiently to be placed before the doors of the deceaſed, and Servius gives the reaſon, "quia hujus generis arbor exciſa non renaſcitur." It not only was ſtationed before the doors, but alſo at the ſepulchres and funeral piles:

Linquenda tellus, et domus, et placens
Uxor, neque harum, quas colis, arborum
Te, præter *inviſas Cupreſſos*,
Ulla brevem dominum ſequetur. HOR.

Lucan informs us that the Cypreſs was only uſed at the funerals of perſons of diſtinction, which circumſtance is rather ſingular, as branches of that tree could be procured at a ſmall expence: He ſays,

Et non plebeïos luctus teſtata *Cupreſſus*. Lib. ii.

Virgil introduces the Cypreſs at the funeral of Polydore:

——————— ſtant manibus aræ,
Cæruleis mæſtæ vittis atraque *Cupreſſo*. ÆN. iii.

It is alſo mentioned at the funeral pile of Miſenus:

Ingentem ſtruxêre pyram: cui frondibus atris
Intexunt latera, et *ferales* ante *Cupreſſos*
Conſtituunt, decorantque ſuper fulgentibus armis. ÆN. vi.

BOOK II. likewiſe may you form them into hedges, topiary works, limits and boundary——*Metas imitata Cupreſſus*——or by ſowing the ſeeds in a ſhallow furrow, and plucking up the ſupernumeraries, where they come too cloſe and thick: for in this work it will ſuffice to leave them within a foot of each other; and when they are riſen about a yard in height (which may be to the half of your paliſado) cut off their tops, as you are taught, and keep the ſides clipped, that they aſcend but by degrees, and thicken at the bottom as they climb. Thus they will preſent you (in half a dozen or eight years) with incomparable hedges, becauſe they are perpetually green, able to reſiſt the winds better than moſt which I know, the Holly only excepted, which indeed has no peer.

5. For when I ſay winds, I mean their fierceſt guſts, not their cold: For though it be ſaid, *Brumâque illæſa Cupreſſus*, and that indeed no froſt impeaches them, (for they grow even on the ſnowy tops of Ida) yet our cruel eaſtern winds do ſometimes mortally invade thoſe which have been late clipped, ſeldom the untouched, or that were dreſſed in the ſpring only. The March and April winds, (in the years 1663 and 1665) accompanied with cruel froſts and cold blaſts, for the ſpace of more than two months, night and day, did not, amongſt near a thouſand Cypreſſes growing in my garden, kill above three or four, which, for being very late cut to the quick, (that is, the latter end of October) were raw of their wounds, took cold, and gangrened; ſome few others, which were a little ſmitten towards the tops, might have eſcaped all their blemiſhes, had my gardener capped them but with a wiſp of hay or ſtraw, as in my abſence I commanded. As for the froſt of thoſe winters, (than which I believe there was never known a more cruel and deadly piercing one ſince England had a name) it did not touch a Cypreſs of mine, till it joined forces with that deſtructive wind: Therefore, for caution, clip not your Cypreſſes late in autumn, and clothe them, if young, againſt theſe winds; for the froſts they only diſcolour them, but ſeldom or never hurt them, as by long experience I have found; nor altogether deſpair of the reſurrection of a Cypreſs, ſubverted by the wind, for ſome have redreſſed themſelves; and one (as Ziphilinus mentions) roſe the very next day, which happening about the reign of the Emperor Veſpaſian, was eſteemed an happy omen. But of ſuch accidents more hereafter.

6. If you affect to ſee your Cypreſs in ſtandard, and grow wild (which may in time come to be of a large ſubſtance, fit for the moſt immortal of

timber, and indeed are the leaſt obnoxious to the rigours of our winters, provided you never clip or diſbranch them) plant of the reputed male ſort; it is a tree which will proſper wonderfully where the ground is hot and gravelly, though, as we ſaid, he be nothing ſo beautiful; and it is of this that the Venetians make their greateſt profit.

7. I have already ſhewed how this tree is to be raiſed from the ſeed; but there was another method amongſt the antients, who, as I told you, were wont to make great plantations of them for their timber: I have practiſed it myſelf, and therefore deſcribe it.

8. If you receive your ſeed in the roundiſh ſmall nuts, which uſe to be gathered thrice a-year, but ſeldom ripening with us, expoſe them to the ſun till they gape, or near a gentle fire, or put them in warm water, as was directed in thoſe of Cedar, by which means the ſeeds will be eaſily ſhaken out; for if you have them open before, they do not yield you half their crop. About the beginning of April, or before, if the weather be ſhowery, prepare an even bed, which being made of fine earth, clap down with your ſpade, as gardeners do for purſelain-ſeed (of old they rolled it with a ſtone or cylinder); upon this ſtrew your ſeeds pretty thick, then ſift over them ſome more mould, ſomewhat better than half an inch in height. Keep them duly watered after ſun-ſet, unleſs the ſeaſon do it for you; and after one year's growth, for they will be an inch high in little more than two months, you may tranſplant them where you pleaſe. If in the nurſery, ſet them at a foot or eighteen inches diſtance in even lines, keeping them watered and moiſt till they are rooted, and fit to be removed. In watering them I give you this caution, which may alſo ſerve you for moſt tender and delicate ſeeds, that you bedew them rather with a broom or ſpergitory, than hazard the beating them out with the common watering-pot; and when they are well come up, be but ſparing of water. Be ſure likewiſe that you cleanſe them when the weeds are very young and tender, leſt, inſtead of purging, you quite eradicate your Cypreſs. We have ſpoken of watering; and indeed, whilſt young, if well followed, they will make a prodigious advance. When that long and incomparable walk of Cypreſs at Fraſcati, near Rome, was firſt planted, they drew a ſmall ſtream (and indeed *irrigare* is properly thus, *aquam inducere riguis*, i. e. in ſmall gutters and rills) by the foot of it (as the water there is in abundance tractable) and made it, as I was credibly informed, arrive to

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ſeven or eight feet height in one year, which does not agree with the epithet, *lenta Cupreſſus*; but with us we may not be too prodigal, ſince, being once well taken, they thrive beſt in our ſandy, light, and warmeſt grounds; whence Cardan ſays, *juxta aquas arcſcit*; meaning in low and mooriſh places, ſtiff and cold earth, &c. where they never thrive.

9. There is alſo a Virginian Cypreſs, of an enormous height, beautiful and very ſpreading, the branches and leaves large and regular, with the clogs reſembling the Cypreſs; and though the timber be ſomewhat coarſe and croſs-grained, it is, when poliſhed, very agreeable, as I can ſhew in a very large table made out of the planks of a Spur only; and have experience of its laſtingneſs, though expoſed both to the air and weather.

10. What the uſes of this timber are, for cheſts and other utenſils, harps, and divers other muſical inſtruments (it being a very ſonorous wood, and therefore employed for organ-pipes, as heretofore for ſupporters of vines, poles, rails, and planks, reſiſting the worm, moth, and all putrefaction to eternity) the Venetians ſufficiently underſtood; who did every twentieth year, and oftener, (the Romans every thirteenth) make a conſiderable revenue of it out of Candy: And certainly a very gainful commodity it was, when the fell of a Cupreſſetum was heretofore reputed a good daughter's portion, and the plantation itſelf called *Dos filiæ*. But there was in Candy a vaſt wood of theſe trees, belonging to the republic, by malice or accident (or perhaps by ſolar heat, as were many woods, ſeventy-four years after, even here in England) ſet on fire, which, beginning *Anno* 1400, continued burning for ſeven years before it could be quite extinguiſhed, being fed for ſo long a ſpace by the unctuous nature of the timber, of which there were to be ſeen at Venice planks of above four feet in breadth: And formerly the valves of St. Peter's church at Rome were framed of this material, which laſted from the great Conſtantine to Pope Eugenius IVth's time, (eleven hundred years) and then were found as freſh and entire as if they had been new But this Pope would needs change them for gates of braſs, which were caſt by the famous Antonio Philarete; not in my opinion ſo venerable as thoſe of Cypreſs. It was in coffins of this material that (as Thucydides tells us) the Athenians uſed to bury their heroes: And the Mummy-cheſts brought with thoſe condited bodies out of Egypt, are many of them of this material, which, it is probable, may have lain in thoſe dry and ſandy Crypta many thouſand years.

11. The timber of this wood was of infinite eſteem with the antients. That laſting bridge built over the Euphrates by Semiramis, was made of this material; and it is reported Plato choſe it to write his laws on, before braſs itſelf, for the diuturnity of the matter. It is certain that it never rifts or cleaves but with great violence; and the bitterneſs of its juice preſerves it from all worms and putrefaction. To this day thoſe of Crete and Malta make uſe of it for their buildings, becauſe they have it in plenty; and there is nothing outlaſts it, or can be more beautiful, eſpecially than the root of the wilder ſort, incomparable for its criſped undulations. Divers learned Perſons have conceived the Gopher mentioned in holy writ, Gen vi. 14. (and of which the ark was built) to have been no other than this Κυπάρισσος, Cupar, or Cuper, by the eaſy mutation of letters. Aben Ezra names it a light wood apt to ſwim; ſo does David Kimchi, which rather ſeems to agree with Fir or Pine, and ſuch as the Greeks call ξύλα τετράγωνα quadrangular trees, about which Critics have made a deal of ſtir; but Iſa. Voſſius, on the LXX. cap. xi. has ſufficiently made it out, that the timber of that denomination was of thoſe ſort of trees whoſe branches break out juſt oppoſite to one another at right angles, which makes it appear to have been Fir, or ſome ſort of wood whoſe arms grow in an uniform manner; but ſurely this is not to be univerſally taken, ſince we find that Yew, and divers other trees, brittle, heavy, and unapt for ſhipping, do often put forth in that order. The ſame learned Author will have Gopher to ſignify only pitch or bitumen, as much as if the text had ſaid, make an ark of reſinous timber. The Caldee paraphraſe tranſlates it Cedar; or, as Junius and Tremellius, Cedrelaten, a ſpecies between Fir and Cedar. Munſter contends for the Pine, and divers able divines endeavour to prove it Cypreſs; and, beſides, it is known that in Crete they employed it for the ſame uſe in the largeſt contignations, and did formerly build ſhips of it: And Epiphanius Hæreſ. lib. i. tells us, ſome relicks of that ark, *circa Campos Sennaar*, laſted even to his days, and was judged to have been of Cypreſs. Some indeed ſuppoſe that Gopher was the name of a place, *à Cupreſſis*, as *Elon*, *à Quercubus*, and might poſſibly be that which Strabo calls *Cupreſſetum*, near Adiabene in Aſſyria. But for the reaſon of its long laſting, coffins (as noted) for the dead were made of it, and thence it firſt became to be *Diti ſacra*; and the valves, or doors, of the Epheſine temple were likewiſe of it, as we obſerved but now, were thoſe of St. Peter's at Rome.

BOOK II. Works of Cypreſs-wood, *permanent ad diuturnitatem**, ſays Vitruvius, lib. ii. And the Poet,

——perpetua nunquam moritura Cupreſſo.

MART. Lib. vi. 73.

The medical virtues of this tree, are for all affects of the nerves, aſtringent and refrigerating, for the hernia, applied outwardly; or, taken inwardly, for the dyſentery, ſtrangury, &c.

12. But to reſume the diſquiſition, whether it be truly ſo proper for ſhipping, is controverted; tho' we alſo find in Caſſiodorus Var. Op. l. v. epiſt. xvi, Theodoric writing to the Prætorio-præfectus that he had cauſed ſtore of it to be provided for that purpoſe; and Plato, who, we told you, made laws and titles to be engraven on it, nominates it, *inter arbores ναυπηγοῖς utiles*, lib. iv. Leg. and ſo does Diodorus, lib. xix. And. as travellers obſerve, there is no other ſort of timber more fit for ſhipping, though others think it too heavy. Ariſtobulus affirms that the Aſſyrians made all their veſſels of it; and indeed the Romans praiſed it, when pitched

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* The Antients conſidered the Cypreſs as a wood not ſubject to decay. Martial, in the forty-ninth Epigram of the ſixth Book, introduces Priapus, ſpeaking of himſelf, as not being made of common wood, but of *incorruptible* Cypreſs.

Non ſum de fragili dolatus ulmo,
Nec quæ ſtat rigida ſupina vena,
De ligno mihi quolibet columna eſt,
Sed viva generata de *Cupreſſo*:
Quæ nec ſæcula centies peracta
Non longæ cariem timet ſenectæ.

This God was conſidered as the Guardian of Vineyards and Gardens. He was cut out of any rough piece of wood into an extraordinary form; and being dreſſed up with reeds on his head, and a ſcythe in his right hand, (Virg. Georg. iv.) was placed in gardens to terrify bird and thieves. Horace thus deſcribes him:

Olim truncus eram ficulnus, inutile lignum;
Cum faber, uncertus ſcamnum faceretne Priapum,
Maluit eſſe Deum. Deus inde ego, furum aviumque
Maxima formido: nam fures dextra coërcet,
Obſcœnoque ruber porrectus ab inguine palus.
Aſt importunas volucres in vertice arundo
Terret fixa, vetatque novis conſidere in hortis. Lib. i. Sat. viii.

with Arabian pitch. And ſo frequent was this tree about thoſe parts of Aſſyria, where the ark is conjectured to have been built, that thoſe vaſt Armadas which Alexander the Great cauſed to be equipped and ſet out from Babylon, conſiſted only of Cypreſs, as we learn out of Arrian in Alex. lib. vii. And Strabo, lib. xvi. Plutarch. Sympoſ. lib. i. prob. c. ii. Vegetius, lib. iv. cap. xxxiv. &c. Paulus Colomeſius, in his Κειμήλια Literaria, cap. xxiv. perſtringes the moſt learned If. Voſſius, that, in his Vindiciæ pro LXX. Interp. he affirms Cypreſs not fit for ſhips, as being none of the τελράγωνοι. But, beſides what we have produced, Fuller, Bochartus, Lilius Gyraldus, lib. de Navig. cap. iv. and divers others, ſufficiently evince it; and that the veſſel built by Trajan was of that material, laſting uncorrupt near 1400 years, when it was afterwards found in a certain lake; if it were not rather, as I ſuſpect, that which Æneas Silvius reports to have been diſcovered in his time, lying under water in the Numidian Lake, cruſted over with a certain ferruginous mixture of earth and ſcales, as if it had been of iron; but, as we have elſewhere noted, it was pronounced to be Larix, and not Cypreſs, employed by Tiberius.——Finally, not to forget even the very chips of this precious wood, which give that flavour to muſcadines and other rich wines, I commend it for the improvement of the air, and a ſpecific for the lungs, as ſending forth moſt ſweet and aromatic emiſſions whenever it is either clipped or handled; and the chips or cones being burnt, extinguiſh moths, and expel the gnats and flies, &c. not omitting the gum which it yields, not much inferior to the Terebinthine or Lentiſc.

We have often mentioned the virtue of theſe odoriferous woods for the improvement of the air, upon which I take occaſion here to add what I have, ſome years ſince, already * publiſhed concerning the melioration of it, in and about this great and populous city, accidentally obnoxious to the effects of thoſe nauſeous vapours exhaling from thoſe many unclean places, and tainting that diſmal cloud of ſulphureous, if not arſenical, ſmoak which we inceſſantly breathe in. I know the late terrible conflagration, by the care and induſtry of the magiſtrate in cauſing ſo many kennels, ſinks, gutters, lay-ſtalls, and other nuiſances (receptacles of a ſtagnant filth) to be removed, muſt needs have exceedingly contributed to the purifying of the air, as I am perſuaded would appear upon a political obſervation in the bills of mortality. But what I cannot yet but deplore, is, that when that ſpacious area was ſo long a *raſa tabula*, the church-yards had not been baniſhed to the north walls of the city, where a grated

* Fumifugium

Book II. incloſure of competent breadth, for a mile in length, might have ſerved for an univerſal cœmetery to all pariſhes, diſtinguiſhed by the like ſeparations, and with ample walks of trees; the walks adorned with monuments, inſcriptions, and titles, apt for contemplation and memory of the defunct; and that wiſe and antient law of the twelve tables reſtored and revived. But concerning this, and Hortulan buryings, ſee chap. i. book iv. Happy, in the mean time, had it been for the further purgation of this auguſt metropolis, had they then baniſhed and proſcribed thoſe helliſh vulcanos, diſgorging from the brew-houſes, ſoap and ſalt-boilers, chandlers, hat-makers, glaſs-houſes, forges, lime-kilns, and other trades, one of whoſe funnels vomits more ſmoak than all the culinary and chamber-fires of a whole pariſh, perniciouſly infecting the ambient air with a black melancholy canopy, to the detriment of the moſt valuable moveables and furniture of the inhabitants, and the whole country around. A bar of iron ſhall be more exeded and conſumed with ruſt in one year in this city, than in thrice ſeven in the country. Why might it not therefore be worth a ſevere and public edict to remove theſe vulcanos, and infernal houſes of ſmoak, to a competent diſtance; ſome down the river; others, which require conveniency of freſh water, up the Thames, among the ſtreams about Wandſworth, &c. their commodities and manufactures brought up to capacious wharfs on the bank, or London ſide, to the increaſe of a thouſand watermen and other labourers, of whom we cannot have too many?

Now, to demonſtrate that the amoval of theſe unſufferable nuiſances would infinitely clarify the air and render it more wholeſome, I ſhall return to my ſubject of trees and plants. The reputation they have had for contributing to the health of whole countries and cities, frequently occurs in hiſtory. For inſtance, the iſland of Cyprus, abounding with the trees of that name, and other reſinous plants, cures ulcerated lungs, &c. Sardinia, replanted with true Anticyran Hellebore, was famous for curing melancholy and madneſs; whilſt Thuſus (eſpecially in ſummer) brought almoſt all the inhabitants to lunacy and diſtraction for want of it. And what effects and benefits ſuch plantations have produced, is conſpicuous in one of the moſt celebrated cities of the eaſt, the famous Iſpahan, cleared of the peſtilence ſince the ſurrounding it with the beautiful Platan, as I have already noted. To theſe add the Bay-tree for abating all ſuch infections; of which ſee many famous inſtances in chap. vi. to which I refer. Not that there are no nociferous trees, as well as ſaniferous, which,

by removing the one, and planting the other in their places, make ſenſible changes for the better. I ſhall give inſtances, when we ſpeak of the Yew, and even that otherwiſe incomparably uſeful ſhrub, the Elder.

Upon what, therefore, has been produced of expedients for the melioration of the air by plantations of proper trees, I cannot but wiſh, that ſince theſe precious materials may now be had at ſuch tolerable rates, as certainly they might from Cape-Florida, the Vermuda, or other parts of the Weſt-Indies, I ſay, I cannot but ſuggeſt, that our more wealthy citizens of London, every day building and embelliſhing their dwellings, might be encouraged to make uſe of Cypreſs-wood in their ſhops, at leaſt for ſhelves, counters, cheſts, tables, wainſcot, the fencerings, as they term it, and mouldings; ſince, beſides the everlaſtingneſs of the wood, enemy to worms, and thoſe other corruptions we have named, it would likewiſe greatly cure and reform the malignancy and corroſiveneſs of the air.

SAVINE*.

The Sabin, or, as we call it, Savine, is not for dignity to be named with the former; but as it is abſolutely the beſt ſuccedaneum to Cypreſs, (which the rigour of our climate is not benign to) our gardeners would do well to increaſe and cultivate it for the other's defects, and bring up nurſeries of them for pyramids, and other tonſile and topiary works. As to its other quality, it has, indeed, an ill report, as moſt other things have when not rightly applied, whilſt there is nothing more efficacious for the deſtruction of worms in little children, the juice being given in a ſpoonful of milk, dulcified with a little ſugar, which brings them away in heaps, as it does in horſes and other cattle, above all other remedies.

There is another berry-bearing Savine in warmer climates, which alſo reſembles the Cypreſs, commonly taken for the Tarrentine Cypreſs, ſo much celebrated by Cato, which grew to noble ſtandards. But that and the Meleſian, worthy the culture, are rare with us, and indeed is as well ſupplied by the more hardy, as well as the Swediſh Juniper, and other ſhrubs.—The Sabine is eaſily propagated by ſlips and cuttings, ſooner than by the ſeeds, which are ſometimes found in the ſmall ſquamous ſeed-caſes.

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* The Savin is a ſpecies of Juniper, and has been deſcribed in the laſt chapter, under the title of *Juniperus* (Sabina) *foliis oppoſitis erectis decurrentibus, ramis patulis.*

Book II.

TAMARISC*.

The Tamariſc, (growing to a conſiderable tree) for its aptneſs to be ſhorn, and governed like the Sabine and Cypreſs, may be entertained, but not for its laſting verdure, which forſakes it in winter, tho' it is ſoon again reſtored. But it has other excellent properties; in particular, it is ſovereign againſt the ſpleen, which, as * Camden tells us, was therefore brought firſt into England by Grindal, Archbiſhop of Canterbury. They alſo made cans of this wood to drink out of. It was of old counted *infe-*

* Elizab.

NOTES.

* There are two ſpecies of this genus.

1. TAMARIX *(Gallica)* floribus pentandris. H. Cliff. 111. *Tamariſk with flowers having five ſtamina.* Tamariſcus Narbonenſis. Lob. Icon. 218. *French Tamariſk.*

This ſort grows naturally in the ſouth of France, in Spain and Italy, where it arrives to a tree of middling ſize; but in England is ſeldom more than fourteen or ſixteen feet high. The bark is rough, and of a dark brown colour; it ſends out many ſlender branches, moſt of which ſpread out flat and hang downward at their ends; theſe are covered with a Cheſnut-coloured bark, and garniſhed with very narrow finely-divided leaves, which are ſmooth, of a bright green colour, and have ſmall leaves or indentures which lie over each other like ſcales of fiſh. The flowers are produced in taper ſpikes at the end of the branches, ſeveral of them growing on the ſame branch. The ſpikes are about an inch long, and as thick as a large earth-worm. The flowers are ſet very cloſe all round the ſpike; they are very ſmall, and have five concave petals of a pale fleſh-colour, with five ſlender ſtamina terminated by roundiſh red ſummits. The flowers appear in July, and are ſucceeded by oblong, acute-pointed, three-cornered capſules, filled with ſmall downy ſeeds, which ſeldom ripen in England.

2. TAMARIX *(Germanica)* floribus decandris. Hort. Cliff. 111. *Tamariſk whoſe flowers have ten ſtamina.* Tamariſcus Germanica. Lob. Icon. 218. *German Tamariſk.*

This kind grows naturally in Germany, in moiſt land: It is rather a ſhrub than a tree, having ſeveral ligneous ſtalks ariſing from the ſame root, which grow erect, ſending out many ſide-branches which are alſo erect; theſe have a pale green bark when young, which afterwards changes to a yellowiſh colour. The leaves are ſhorter, and ſet cloſer together than thoſe of the other ſort, and are of a lighter green, approaching to a gray colour; the flowers are produced in long looſe ſpikes at the end of the branches, ſtanding erect; they are larger than thoſe of the former, and have ten ſtamina ſtanding alternately. It flowers about the ſame time as the former.——Both theſe ſorts caſt their leaves in autumn, and it is pretty late in the ſpring before the young leaves puſh out, which renders them leſs

lix, and under malediction; and therefore uſed for wreaths to be put on the heads of malefactors. CHAP. III.

THUYA*.

This tree, by ſome called Arbor Vitæ, (brought from Canada) is of moderate ſtature, bearing a ragged leaf not unlike the Cypreſs, only ſomewhat flatter, and not ſo thick ſet and cloſe. It is of a hardy green all the winter, (though a little tarniſhed in very ſharp weather) and bears ſmall longiſh clogs and ſeeds (but takes much better by layers and ſlips) as thoſe we have before mentioned, and may be kept in the ſame ſhapes, but moſt delights in the ſhade, where the roots running ſhallow, the ſtem needs ſupport. The leaf being bruiſed between the fingers emits a powerful ſcent, not eaſily conquered, ſeeming to breathe ſomething of a ſanative

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valuable; they are now frequently planted in gardens for ornament, and, when mixed with other ſhrubs, make a pretty variety.

This genus of plants is of the claſs and order *Pentandria Trigynia*.

The culture of both ſorts of Tamariſk is very eaſy: Every cutting will grow that is ſet in winter, and will be a good plant by the autumn following. The encreaſing of them by layers has been recommended; but this is bad advice, not only as being unneceſſary trouble, when they will grow ſo freely by cuttings, but becauſe layers of this tree very often will not ſtrike root at all. The beſt time for the work is October, though any time of the winter will do. The cuttings ſhould be of the laſt ſummer's ſhoot; and a moiſt part of the garden is moſt eligible for them to be planted in. In two years they will be good plants for the wilderneſs or ſhrubbery, and may then be planted out in almoſt any ſoil, though they beſt like a light moiſt earth, eſpecially the German ſort; for in countries where it grows naturally it is generally found in low watery grounds.

* Of the THUYA there are two Species.

1. THUYA *(Occidentalis)* ſtrobilis lævibus, ſquamis obtuſis. H. Cliff. 449. *Thuya with ſmooth cones and obtuſe ſcales.* Thuya Theophraſti. C. B. P. 488. *The common Arbor Vitæ.*

This ſort grows naturally in Canada, Siberia, and other northern countries, and has been long an inhabitant in the Engliſh gardens. In ſome of theſe gardens, which have not been altered, there are a few of theſe trees which are of a large ſize: The Thuya has a ſtrong woody trunk, which riſes to the height of thirty

Book II. ointment, and (as I am told) makes one of the beſt for the cloſure of green and freſh wounds. But that thoſe curious utenſils and works of the Turner, bowls, boxes, cups, mortars, peſtles, &c. are of this material, as is pretended, is a miſtake; being rather of ſome of the exotic more cloſe and ponderous woods, as Braſil, Logwood, &c. Upon recenſion therefore of theſe exotics, I cannot but encourage the more frequent raiſing the reſt of thoſe Semper-vivents, eſpecially ſuch as are fitteſt for the ſhrubby parts and furniture of our groves, mere gardens of pleaſure, which none but the Evergreen become. To theſe we might add (not for their verdure only) other more rare exotics, Styrax Arbor and Terebynth; noting, by the way, that we have no true turpentine to be bought in our ſhops, but what is from the Larch, whilſt apothecaries ſubſtitute that which extils from the Fir-tree inſtead of it: All of them minding me again of the great opportunities and encouragement we have of every day improving

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feet or more. The bark, while young, is ſmooth, and of a dark brown colour, but, as the trees advance, the bark becomes cracked and leſs ſmooth. The branches are produced irregularly on every ſide, ſtanding almoſt horizontal, and the young ſlender ſhoots frequently hang downward; theſe branches ſtand but thin, and the younger branches only are garniſhed with leaves, ſo that when the trees are grown large, they make but an indifferent appearance, being ſo thinly cloathed with leaves. The young branches are flat, and the ſmall leaves are placed imbricatim over each other like the ſcales of fiſh; the flowers are produced from the ſide of the young branches, pretty near to the foot-ſtalk; the male flowers grow oblong catkins, and between theſe the female flowers are collected in form of cones. When the former have ſhed their farina, they ſoon after drop off, but the female flowers are ſucceeded by oblong cones, having obtuſe ſmooth ſcales, containing one or two oblong ſeeds. It flowers early in the ſpring, and the ſeeds ripen in September. The leaves of this tree have a rank oily ſcent when bruiſed.—— Profeſſor Kalm informs us that this tree is not ſeen farther ſouth than Saratoga in the Province of New York, which place is forty-two degrees and ten minutes north latitude. The Canadians call it *Cedre blanc*. In its natural ſtate it ſeems to prefer ſwamps, marſhes, and other wet places, where it grows the beſt. In Canada the talleſt trees do not exceed thirty-ſix feet.

2. THUYA *(Orientalis)* ſtrobilis ſquarroſis, ſquamis acuminatis reflexis. Hort. Upſal. 289. *Thuya with rugged cones, and acute-pointed reflexed ſcales.* Thuya ſtrobilis uncinatis, ſquamis reflexo-acuminatis. Flor. Leyd. Prod. 87. *The China Arbor Vitæ.*

This kind grows naturally in the northern parts of China, where it riſes to a conſiderable height. The ſeeds were firſt ſent to Paris by ſome of the Miſſionaries, and there are ſome of the trees growing in the gardens of ſome curious perſons

our ſtores with ſo many uſeful trees from the American plantations, for which I have the ſuffrage of the often-cited Mr. Ray, who is certainly a very able judge. Might we not therefore attempt the more frequent Locuſt, Saſſafras, and that ſort of Elm, or Sugar-tree, whoſe juice yields that ſweet? Alſo the Halymus Latifolius, and ſeveral others, for encouragement. But,

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there, which are more than twenty feet high. The branches of this ſort grow cloſer together, and are much better adorned with leaves, which are of a brighter green colour, ſo make a much better appearance than the other; being very hardy, it is eſteemed much preferable to moſt of the evergreen trees with ſmall leaves, for ornament in gardens. The branches of this tree croſs each other at right angles; the leaves are flat, but the ſingle diviſions of the leaves are ſlender, and the ſcales are ſmaller, and lie cloſer over each other than thoſe of the firſt ſort. The cones are alſo much larger, and of a beautiful gray colour; their ſcales end in acute reflexed points.

In the Linnæan ſyſtem this tree is of the claſs and order *Monoecia Monadelphia*. The flowers come out early in the ſpring, but make a mean appearance.

The Arbor Vitæ is propagated by ſeeds, layers, and cuttings. The firſt method makes the beſt trees, though the latter are generally practiſed.

The celebrated Profeſſor Kalm, in his Travels into North-America, obſerves of the Occidental *Arbor Vitæ*, that it is reckoned the moſt durable wood in Canada: "Inclоſures of all kinds are made of it. All the poſts which are driven into the ground, "are of the Thuya wood. The paliſades round the forts in Canada are likewiſe made "of the ſame wood. The planks in the houſes are made of it; and the thin narrow "pieces of wood which form both the ribs and the bottom of the bark-boats, commonly made uſe of here, are taken from this wood, becauſe it is pliant enough for "the purpoſe, eſpecially whilſt it is freſh, and likewiſe becauſe it is very light. The "Thuya wood is reckoned one of the beſt for the uſe of lime-kilns. Its branches are "uſed all over Canada for beſoms; and the twigs and leaves of it being naturally bent "together, ſeem to be very proper for the purpoſe. The Indians make ſuch beſoms, "and bring them to the towns for ſale; nor do I remember having ſeen beſoms of "any other wood. The freſh branches have a peculiar ſcent, which is ſtrongly perceived in houſes where they make uſe of beſoms of this tree.

"This Thuya is made uſe of for ſeveral medicinal purpoſes. The Commandant "of Fort St. *Frederic*, M. *de Luſignan*, could never ſufficiently praiſe its excellence for "rheumatic pains. He told me he had often ſeen it tried, with remarkable ſucceſs,

Book II. I produce not theſe particulars, and other *amæna vireta* already mentioned, as ſignifying any thing to timber, the main deſign of this treatiſe, (though I read of ſome Myrtles ſo tall as to make ſpear-ſhafts) but to exemplify in what may be farther added to ornament and pleaſure, by a cheap and moſt agreeable induſtry.

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" upon ſeveral perſons, in the following manner: The freſh leaves are pounded in a " mortar, and mixed with hog's greaſe, or any other greaſe. This is boiled together " till it becomes a ſalve, which is ſpread on linen, and applied to the part where the " pain is. The ſalve gives certain relief in a ſhort time. Againſt violent pains, " which move up and down in the thighs, and ſometimes ſpread all over the body, " they recommend the following remedy: Take of the leaves of a kind of Polypody * " four-fifths, and of the cones of the Thuya one-fifth, both reduced to a coarſe pow- " der by themſelves, and mixed together afterwards. Then pour milk-warm water " on it, ſo as to make a poultice, which ſpread on linen, and wrap it round the body; " but as the poultice burns like fire, they commonly lay a cloth between it and the " body, otherwiſe it would burn and ſcorch the ſkin. I have heard this remedy prai- " ſed beyond meaſure, by people who ſaid they had experienced its good effects. An " Iroqueſe Indian told me, that a decoction of Thuya leaves was uſed as a remedy for " the cough. In the neighbourhood of Saratoga, they uſe this decoction in the in- " termitting fever.

" This tree has, in common with many other American trees, the quality of grow- " ing freely in marſhes and thick woods, which may be with certainty called its " native places. However, there is ſcarce a ſingle Thuya tree in thoſe places which " bears ſeeds; if, on the other hand, a tree accidentally ſtands on the outſide of a " wood, on the ſea-ſhore, or in a field, where the air can freely come at it, it is al- " ways full of ſeeds. I have found this to be the caſe with the Thuya, on innume- " rable occaſions."

* Polypodium fronde pinnata, pinnis alternis ad baſin ſuperne appendiculatis.

Pl. 19



The Oriental Plane Tree.

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CHAP. IV.

The PLATANUS*, LOTUS, CORNUS, *and* ACACIA.

PLATANUS. This beautiful and precious tree, antiently ſacred to Helena (and with which ſhe crowned the Lar and Genius of the place) was ſo doated on by Xerxes, that Ælian and other Authors tell us he made halt, and ſtopped his prodigious army of ſeventeen hundred thouſand ſoldiers, which even covered the ſea, exhauſted rivers, and thruſt mount Athos from the continent, to admire the pulcritude and procerity of one of them; and became ſo fond of it, that, ſpoiling both himſelf, his concubines, and great perſons of all their jewels, he covered it with gold, gems, necklaces, ſcarfs and bracelets, and infinite riches: In ſum, was ſo enamoured of it, that for ſome days neither the concernment of his grand expedition, nor intereſt of honour, nor the neceſſary motion of his portentous army, could perſuade him from it: He ſtiled it his Miſtreſs, his Minion, his Goddeſs; and when he was forced to part from it, he cauſed the figure of it to be ſtamped on a medal of gold, which he continually wore about him. Wherever they built their ſumptuous and magnificent colleges for the exerciſe of youth in Gymnaſtics, as Riding, Shooting,

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* Of this Tree there are only two Species.

1. PLATANUS *(Orientalis)* foliis palmatis. Hort. Cliff. 447. *Plane-tree with hand-ſhaped leaves.* Platanus Orientalis verus. Park. Theat. 1427. *The true Eaſtern Plane-tree.*

This kind grows naturally in Aſia, where it becomes very large; the ſtem is tall, erect, and covered with a ſmooth bark, which annually falls off; it ſends out many ſide-branches, which are generally a little crooked at their joints; the bark of the young branches is of a dark brown, inclining to a purple colour; they are garniſhed with leaves placed alternate; their foot-ſtalks are an inch and a half long; the leaves are ſeven inches long and eight broad, deeply cut into five ſegments, and the two outer are ſlightly cut again into two more; theſe ſegments have many acute indentures on their borders, and have each a ſtrong mid-rib, with many lateral veins running to the ſides; the upper ſide of the leaves is of a deep green, and the under ſide pale.——Dionyſius, the Geographer, compares the form of the Morea, or antient Peloponneſus, to the leaves of this tree, making the foot-ſtalk to be the Iſthmus by which it is joined to Greece. The flowers come out upon long foot-ſtalks or ropes hanging downward, each ſuſtaining

BOOK II. Wreſtling, Running, &c. (like to our French Academies) and where the graver Philoſophers alſo met to converſe together and improve their ſtudies, betwixt the Xiſta and Subdiales ambulationes (which were portico's open to the air) they planted groves and walks of Platans, to refreſh and ſhade the Palæſtritæ, as you have them deſcribed by Vitruvius, lib. v. cap. xi.

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five or ſix round balls of flowers; the upper, which are the largeſt, are more than four inches in circumference; theſe ſit very cloſe to the foot-ſtalks. The flowers are ſo ſmall as ſcarce to be diſtinguiſhed without glaſſes; they come out a little before the leaves, which is in the beginning of June; and in warm ſummers the ſeeds will ripen late in autumn, and if left upon the trees will remain till ſpring, when the balls fall to pieces, and the briſtly down which ſurrounds the ſeeds helps to tranſport them to a great diſtance with the wind.

2. PLATANUS *(Occidentalis)* foliis lobatis. Hort. Cliff. 447. *Plane-tree with lobated leaves.* Platanus Occidentalis ſ. Virginienſis. Park. Theat. 1427. *Occidental or Virginian Plane-tree.*

This ſort is naturally produced in moſt parts of North-America; it grows to a large ſize, with a ſtraight ſtem of equal girt moſt part of the length; the bark is ſmooth, and annually falls off like that of the other; the branches extend wide on every ſide; the young ones have a browniſh bark, but on the old ones it is gray; the foot-ſtalks of the leaves are three inches long; the leaves are ſeven inches long, and ten broad; they are cut into three lobes or angles, and have ſeveral acute indentures on their borders, with three longitudinal midribs, and many ſtrong lateral veins. The leaves are of a light green on their upper ſide, and pale on their under. The flowers grow in round balls like the former, but are ſmaller. The leaves and flowers come out at the ſame time with the former, and the ſeeds ripen in autumn.

The Platanus is of the claſs and order *Monoecia Polyandria.*

The flowers come out late in the ſpring, and are ſo ſmall as ſcarcely to be viſible to the naked eye. The buds of the leaves of the oriental ſort begin to ſwell about the fourteenth of April, and the leaves are generally out by the latter end of the ſame month.

Beſides the two ſpecies already deſcribed there are two varieties: 1. The Spaniſh Plane-tree; 2. The Maple-leaved Plane-tree.

The Spaniſh Plane-tree has larger leaves than either of the other ſorts; they are more divided than thoſe of the Occidental, but not ſo much as the Eaſtern. Some of the leaves are cut into five and others into three lobes; theſe are ſharply indented on the edges, and are of a light green; the foot-ſtalks are ſhort, and covered with a ſhort down. This is by ſome called the Middle Plane-tree, from its leaves being ſhaped



Arbre Occidental à Plane à Fruit.

Publié par la Société d'Histoire Naturelle de Paris.

J. L. Miller del. Sculp.

and as Claudius Perrault has aſſiſted the text with a figure or ichnographical plot. Theſe trees the Romans firſt brought out of the Levant, and cultivated with ſo much induſtry and coſt, for their ſtately and proud heads only, that the great Orators and Stateſmen, Cicero and Hortenſius, would exchange now and then a turn at the bar, that they might have the pleaſure to ſtep to their villas, and refreſh their Platans, which they would often irrigate with wine inſtead of water: *Crevit & affuſo latior umbra mero.* And ſo prized was the very ſhadow of this tree, that when afterwards they tranſplanted it into France, they exacted a *Solarium*, by way of tribute, of any of the natives who ſhould preſume but to put his head under it.

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between thoſe of the two other ſorts. It grows rather faſter than either of the other kinds.

The Maple-leaved Plane-tree differs from the two genuine ſpecies, in having its leaves not ſo deeply cut as the Eaſtern, nor lobed as the Weſtern kind. The foot-ſtalks of the leaves are much longer than thoſe of the above ſorts, and the upper ſurface of the leaves is rougher.

The Oriental and Spaniſh Plane-trees are propagated from ſeeds, when they can be procured; but whoever enjoys not this convenience, muſt have recourſe to layers. The ground proper for the ſeminary ſhould be moiſt and ſhady, well dug, and raked till the mould is fine; then, in the autumn, ſoon after the ſeeds are ripe, let them be ſcattered over this ground, and the ſeeds raked in, in the ſame manner as turnip-ſeeds. In the ſpring many of the young plants will come up, though you muſt not expect the general crop till the ſecond year; the ſpring after which they may be taken out of the ſeminary, and planted in the nurſery in rows one yard aſunder, and at one foot and a half diſtance in the rows. Here they may remain, with the uſual care of digging between the rows and keeping them clean, till they are of ſufficient ſize to plant out for good.

Where the ſeeds of theſe trees cannot be procured, layering muſt be the method of propagation. For this purpoſe a ſufficient number muſt be planted out for ſtools on a ſpot of earth double dug: After they have ſtood one year, they ſhould be cut down, in order to make them throw out young wood for layering. The autumn following theſe ſhould be laid in the ground, with a little nick at the joint; and by that time twelvemonths they will be trees of a yard high, with a good root, ready to be planted out in the nurſery, where they may be managed as the ſeedlings; and as the ſtools will have ſhot up freſh young wood for a ſecond operation, this treatment may be continued *ad libitum*.

The Occidental Plane-tree is propagated by cuttings; which if they are taken from ſtrong young wood, and planted early in the autumn, in a moiſt good mould, will hardly fail of ſucceeding. They are generally planted thick, and then removed into the nurſery-ground, as the layers of the other ſort: But if a large piece of moiſt ground was ready, the cuttings might be placed at ſuch a diſtance as not to approach

BOOK II. But whether for any extraordinary virtue in the ſhade, or other propitious influence iſſuing from the tree, a worthy Knight, who ſtaid at Iſpahan in Perſia, when that famous city was infected with a raging peſtilence, told me, that ſince they have planted a greater number of theſe noble trees about it, the plague has not come nigh their dwellings. Pliny affirms there is no tree whatſoever which ſo well defends us from the heat of the ſun in ſummer, nor that admits it more kindly in winter. And, for our encouragement, I do, upon experience, aſſure you, that they will flouriſh and abide with us, without any more trouble than frequent and plentiful watering, which, from their youth, they exceſſively delight in, and gratefully acknowledge by their growth accordingly; ſo as I am perſuaded that, with very ordinary induſtry, they might be propagated to the incredible ornament of the walks and avenues to great men's houſes. The introduction of this true Plane among us is, perhaps, due to the great Lord Chancellor Bacon, who planted thoſe (ſtill flouriſhing ones) at Verulam; as to mine, I owe it to that Honourable Gentleman, the late Sir George Crook, of

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too cloſe before they were of a ſufficient ſize to plant out for good; and this would ſave the expence and trouble of a removal. The Oriental Plane-tree will grow from cuttings, but not ſo certainly as this; and whoever has not the convenience of proper ground for the cuttings of either, muſt have recourſe to layers with this tree alſo; which, indeed, is always the ſureſt and moſt effectual method.

Plane-trees delight in a moiſt ſituation, eſpecially the Occidental ſort; where the land is inclined to be dry, and Plane-trees are deſired, the other kinds are to be preferred. But in moiſt places, by the ſides of rivulets, ponds, &c. the Occidental makes ſuch ſurpriſing progreſs as induces me to think that it might be ranked amongſt the Aquatics, without any impropriety.

The Oriental Plane-tree was greatly reſpected by the antients for its cooling ſhade:

Jamque miniſtrantem Platanum potantibus umbram. VIRG.

And ſo great was their veneration for it, that in the height of their Enthuſiaſm they uſed to refreſh its roots with wine inſtead of water. Tantumque poſtea honoris increvit, ut mero infuſo enutriantur: compertum id maxime prodeſſe radicibus; docuimuſque etiam arbores vina potare. PLIN.

In the ACADEMIA, or School of Plato, the Philoſophers uſed to walk and converſe together under the ſhade formed by theſe delightful trees; to which cuſtom Horace alludes:

Atque inter Silvas Academi quærere verum. Lib. ii. Ep. ii.

Pliny informs us that this tree was firſt brought over the Ionian Sea, into the Iſland of Diomedes, for a monument for that Hero: thence into Sicily, and ſo into Italy, where it has continued ever ſince to give coolneſs and refreſhment to the inhabitants in the height of ſummer.

Oxfordſhire, from whoſe bounty I received an hopeful plant now growing in my Villa; nor methinks ſhould it be ſo great a rarity, if it be true that, being brought from Sicily, it was planted as near us as the Morini. CHAP. IV.

There was lately at Baſil, in Switzerland, an antient goodly Platanetum, and now in France they are come again in vogue: I know it was antiently accounted ἄκαρπος; but they may with us be raiſed of their ſeeds with care, in a moiſt ſoil, as here I have known them. But the reaſon of our little ſucceſs is, that we very rarely have them ſent us ripe; theſe ſhould be gathered late in autumn, and brought us from ſome more Levantine parts than Italy. They come alſo of layers abundantly, affecting a freſh and feeding ground; for ſo they plant them about their rivulets and fountains. The Weſt-Indian Plane is not altogether ſo rare, but it riſes to a goodly tree, and bears a very ample and leſs jagged leaf: That the Turks uſe their Platanus for the building of ſhips, I learn out of Ricciolus Hydrog. lib. x. cap. xxxvii. And Pliny informs us that canoes and veſſels for the ſea have been excavated out of their prodigious trunks.

LOTUS *.

I have the ſame opinion of the Lotus Arbor, (another lover of the water) which in Italy yields both an admirable ſhade, and timber immortal, growing to a vaſt tree, where it comes ſpontaneouſly; but its fruit ſeems not

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* Of this tree there are three ſpecies.

1. CELTIS *(Auſtralis)* foliis lanceolatis, acuminatis, ſerratis, nervoſis. Mill. Dict. *Nettle tree with ſpear-ſhaped pointed leaves, which are veined and ſawed on their edges.* Celtis fructu nigricante. Tourn. Inſt. 612. *Lote tree with a black fruit.* Lotus ſ. Celtis. Com. epit. 155. Lotus Arbor. Lob. Ic. 186.

This ſort grows naturally in the ſouth of France, in Spain and Italy, in which countries it grows to a tree of conſiderable ſize; in England it is not ſo common as the ſecond kind.——It riſes with an upright ſtem to the height of forty or fifty feet, ſending out many ſlender branches upward, which have a ſmooth dark-coloured bark, with ſome ſpots of gray; theſe are garniſhed with leaves placed alternately, which are near four inches long, and about two broad in the middle, ending in long ſharp points, and deeply ſawed on their edges, having ſeveral tranſverſe veins which are prominent on their under ſide. The flowers come out from the wings of the leaves all along the branches; they have a male and an hermaphrodite flower generally at the ſame place, the male flowers being ſituated above the

Book II. ſo tempting as it is ſtoried it was to the companions of Ulyſſes. The firſt who brought the Lotus out of Virginia, was the late induſtrious Tra-

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others: theſe have no petals but a green herbaceous empalement, ſo make no figure; they come out in the ſpring, at the ſame time when the leaves make their firſt appearance, and generally decay before the leaves have grown to half their magnitude. After the flowers are paſt, the germen of the hermaphrodite flowers becomes a round berry about the ſize of a large pea, which is black when ripe.

2. CELTIS *(Occidentalis)* foliis obliquè-ovatis, ſerratis, acuminatis. Lin. Sp. Pl. 1478. *Nettle tree with oblique, oval, pointed leaves, which are ſawed on their edges.* Celtis fructu obſcurè purpuraſcente. Mill. Dict. *Lote tree with a dark purple fruit.* Lotus Arbor Virginiana, fructu rubro. Raii Hiſt. 1917.

This grows naturally in North-America; it delights in a moiſt rich ſoil, in which it becomes a very large tree. It riſes with a ſtraight ſtem, which in young trees is ſmooth and of a dark colour, but as they advance it becomes rougher, and of a lighter green. The branches are much diffuſed on every ſide, and are garniſhed with oblique oval leaves, ending in points, and ſawed on their edges; they are placed alternately on the branches, with pretty long foot-ſtalks. The flowers come out oppoſite to the leaves upon pretty long foot-ſtalks, the male flowers ſtanding above the hermaphrodite as in the other ſpecies; after theſe decay the hermaphrodite flowers are ſucceeded by roundiſh berries, which are ſmaller than thoſe of the firſt ſort, and, when ripe, are of a dark purple colour. This tree flowers in May, and the ſeeds ripen in October. Of this ſort there are ſeveral pretty large trees in the Engliſh gardens, ſome of which produce great quantities of fruit annually, which, in favourable ſeaſons, come to maturity, ſo that from theſe ſeeds there have been plants raiſed; and there are few years in which there is not fruit of this ſort ſent from America, whereby it is now become pretty common in the Engliſh nurſeries.

3. CELTIS *(Orientalis)* foliis ovato-cordatis, denticulatis, petiolis brevibus. Mill. Dict. *Nettle tree with oval heart-ſhaped leaves, ſlightly indented, and ſhort foot-ſtalks.* Celtis orientalis minor, foliis minoribus & craſſioribus, fructu flavo. Inſt. Cor. 42. *Smaller Eaſtern Lote tree with ſmaller and thicker leaves, and a yellow fruit.*

This ſort was diſcovered by Dr. Tournefort in Armenia, from whence he ſent the ſeeds to the Royal Garden at Paris, where they ſucceeded, and the trees, which were there raiſed, have produced fruit for ſeveral years; ſo that moſt of the curiou gardens in Europe have been furniſhed with it from thence.—It riſes with a ſtem about ten or twelve feet high, dividing into may branches, which ſpread horizontally on every ſide, having a ſmooth greeniſh bark, garniſhed with leaves about an inch and a half long, and near an inch broad, inclining to a heart-ſhape, but are oblique, one of the ears of the baſe being ſmaller and lower than the other; they are of a thicker texture than thoſe of the common ſort, and

deſcant. Of this wood are made pipes, and wind inſtruments; and of its root, hafts for knives, and other tools. The offer of Craſſus to Domitius

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of a paler green, placed alternate on the branches, and have ſhort foot-ſtalks. The flowers come out from the foot-ſtalks of the leaves, in the ſame manner as the former, and are ſucceeded by oval yellow berries, which, when fully ripe, turn of a darker colour. The wood of this tree is very white.

The Celtis, or Lotus Arbor, is of the claſs and order *Polygamia Monoecia*.

Theſe trees are all propagated by ſeeds, which ſhould be ſown ſoon after they are ripe, when they can be procured at that ſeaſon, for they frequently come up the following ſpring; whereas, thoſe which are ſown in the ſpring, will not come up till a twelvemonth after; therefore it is the beſt way to ſow them in pots or tubs, that they may be eaſily removed, for thoſe which are ſown in the ſpring ſhould be placed in a ſhady ſituation in ſummer, and conſtantly kept clean from weeds; but in autumn they ſhould be placed in a warm ſituation, plunging the pots into the ground; and if they are covered over with a little tan from a decayed hot-bed, it will prevent the froſt from penetrating the earth to injure the ſeeds; and if theſe pots are placed on a gentle hot-bed in the ſpring, it will greatly forward the vegetation of the ſeeds, whereby the plants will have more time to get ſtrength before the winter: but when the plants appear above ground they muſt have a large ſhare of air admitted to them, otherwiſe they will be drawn up weak; and as ſoon as the weather is warm, they muſt be expoſed to the open air, and in ſummer they muſt be conſtantly kept clean from weeds; if the ſeaſon proves dry, they will require water two or three times a week. In autumn it will be proper to remove the pots, and place them under a hot-bed frame, to ſhelter them in winter from ſevere froſt; or, where there is not that conveniency, the pots ſhould be plunged into the ground near a wall or hedge; and as the plants, when young, are full of ſap, and tender, the early froſts in autumn frequently kill the upper part of the ſhoots; therefore the plants ſhould be either covered with mats, or a little ſtraw or Peaſe-haulm laid over them to protect them.

In the following ſpring the plants ſhould be taken out of the ſeed-pots, and planted in the full ground: this ſhould be done about the middle or latter end of March, when the danger of the froſt is over; therefore a bed or two ſhould be prepared (according to the number of plants raiſed) in a ſheltered ſituation, and, if poſſible, in a gentle loamy ſoil. The ground muſt be well trenched, and cleared from the roots of bad weeds, and, when levelled, ſhould be marked out in lines at one foot diſtance; then the plants ſhould be carefully turned out of the pots and ſeparated, ſo as not to tear their roots, and planted in the lines at ſix inches aſunder, preſſing the earth down cloſe to the roots. If the ground be very dry when they are planted, and there is no appearance of rain ſoon, it will be proper to water the beds, to ſettle the ground to the roots of the plants; and after this, if the ſurface of the ground be cover-

Book II. for half a dozen of theſe trees, growing about a houſe of his in Rome, teſtifies in what eſteem they were had for their incomparable beauty and uſe.

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ed with ſome old tan or rotten dung, it will keep it moiſt, and prevent the drying winds from penetrating to the roots of the plants.

The following ſummer the neceſſary care muſt be to keep them conſtantly clean from weeds; but after the plants are pretty well eſtabliſhed in the ground, they will not require any water, eſpecially toward the latter end of ſummer, for that will occaſion their late growth, whereby they will be in great danger of ſuffering by the autumn froſts; for the more any of theſe young trees are ſtopped in their growth by drought towards autumn, the firmer will be their texture, which will enable them to bear the ſeverity of winter.

The plants may remain in the nurſery two years, by which time they will have obtained ſufficient ſtrength to be tranſplanted where they are deſigned to remain for good, becauſe theſe plants extend their roots wide every way; ſo that if they ſtand long in the nurſery, their roots will be cut in removing, which will be a great prejudice to their future growth.

Theſe ſorts are hardy enough to thrive in the open air in England, after they are become ſtrong; but for the two firſt winters after they come up from ſeeds, they require a little protection, eſpecially the third ſort, which is tenderer than either of the former. The young plants of this ſort frequently have variegated leaves; but thoſe are more impatient of cold than the plain-leaved.

The wood of the Lotus tree was antiently uſed for flutes and other muſical inſtruments:

——— et horrendo lotos adunca ſono. Ov. *Faſt.*

Mr. Evelyn judges very properly when he ſuppoſes that the fruit of the *Lotus Arbor* could not be the ſame that was feaſted upon by the companions of Ulyſſes. The enchanting fruit, deſcribed by the antients, is produced in Barbary upon a ſhrub which Linnæus calls Rhamnus (Lotus) aculeis geminatis; altero recurvo, foliis ovato-oblongis. Tournefort calls it Zizyphus Sylveſtris. Dr. Shaw, in his Travels into Barbary, had frequent opportunities of examining the ſhrub in queſtion: He ſays, "This ſhrub, which is very common in the *Jereede*, and other parts of Barbary, has the leaves, prickles, flower and fruit of the Zizyphus, or Jubeb; only with this difference, that the fruit is here round, ſmaller, and more luſcious, and at the ſame time the branches, like thoſe of the Paliurus, are neither ſo much jointed nor crooked. The fruit is in great repute, taſtes ſomething like ginger-bread, and is ſold in the markets all over the ſouthern diſtricts of theſe kingdoms. The Arabs call it *Aneb enta el Seedra*, or the *Jubeb* of the *Seedra*, which Olavus Celſius had ſo high an opinion of, that he has deſcribed it as the Dudaim of the Sacred Scriptures."

CORNEL*.

The Cornel tree, though not mentioned by Pliny for its timber, is exceedingly commended for its durableneſs and uſe in wheel-work, pins, and wedges, in which it laſts like the hardeſt iron, and it will grow with us to good bulk and ſtature. The preſerved and pickled berries (or Cherries CHAP. IV.

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The Lotus tree, here deſcribed, is mentioned by Homer. It gave name to a race of people deſcribed in the ninth Odyſſey:

They went, and found an hoſpitable race:
Not prone to ill, nor ſtrange to foreign gueſt,
They eat, they drink, and Nature gives the feaſt;
The trees around them all their food produce,
Lotus the name, divine, nectareous juice!
(Thence call'd *Lotophagi*) which whoſo taſtes,
Inſatiate riots in the ſweet repaſts,
Nor other home, nor other care intends,
But quits his houſe, his country, and his friends. POPE.

It will be proper to diſtinguiſh between this Shrub and an *herb* often mentioned by the antients, under the name of Lotus. Homer ſpeaks of it as being fed upon by the horſes of Achilles; and Virgil mentions it as proper for ſheep to increaſe their milk:

Et cui lactis amor, cytiſos, *lotoſque* frequentes
Ipſe manu, ſalſaſque ferat præſepibus herbas. GEORG. iii.

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* This is the CORNUS *(Mas)* arborea, umbellis involucrum æquantibus. Hort. Cliff. 38. *Tree Dogwood with umbels equal to the involucrum.* Cornus hortenſis mas. C. B. P. 447. *Male Cornel, or Cornelian Cherry tree.*

As the fruit of this tree is not at preſent much eſteemed, the nurſery-men about London propagate it as one of the ſorts which is commonly ſold as a flowering ſhrub, and is by ſome people valued for coming ſo early to flower; for if the ſeaſon is mild, the flowers will appear by the beginning of February; and tho' there is no great beauty in the flowers, yet, as they are generally produced in plenty, at a ſeaſon when few other flowers appear upon trees, a few plants of them may be admitted for variety. The fruit of this tree is ſeldom ripe before September. The tree will grow to the height of eighteen or twenty feet, forming a large head.

This tree is of the claſs and order *Tetrandria Monogynia.*

The Cornelian Cherry tree ſhould be raiſed from ſeeds. Theſe ſhould be ſown in the autumn, ſoon after they are ripe, or they will not come up till the ſecond ſpring; and ſometimes, when the intermediate ſummer has proved very dry, they will not appear

Book II. rather) are moſt refreſhing, an excellent condiment, and do alſo well in tarts. But it is very odd what Mathiolus affirms upon his own experience, that one who has been bitten of a mad dog, if in a year after he handle the wood of this tree till it grows warm, relapſes again into his former diſtemper.

The ſame is reported of the Cornus Fæmina, or Wild Cornel, which is like the former for compactneſs, and made uſe of for cart-timber, and other ruſtick inſtruments; it alſo makes the beſt of butchers' ſcewers and tooth-pickers. In ſome countries abroad they decoct the berries, which, preſſed, yield an oil for the lamp.

ACACIA*.

The Acacia, together with that from Virginia, deſerves a place among our avenue trees, (could they be made to grow upright) adorning our walks with their exotic leaf and ſweet flowers, very hardy againſt the pinching winter, but not ſo proof againſt its bluſtering winds, though it be armed

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till the ſummer after; ſo that great care ſhould be uſed to get theſe ſeeds into their beds as ſoon as poſſible; or if the work cannot be done before the ſpring, and the plants do not come up, the bed ſhould be left undiſturbed for at leaſt the two ſeaſons following.

When the plants have made their appearance, they may ſtand in the ſeed-beds a year or two to acquire ſtrength; during which time they ſhould be kept clean of weeds, and in dry weather watered. After this, they ſhould be planted out in the nurſery, in rows, where they may remain, with the uſual care, till they are fit to be planted out for good; the beſt ſeaſon for which is the autumn.

The Cornelian Cherry tree is a native of Miſnia, Auſtria, and ſome other places, but grows very well with us; and may be planted with ſucceſs on moſt ſoils.

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* The Triple-thorned Acacia is titled, *Gleditſia ſpinis triplicibus axillaribus.* In the Upſal Catalogue it is termed ſimply, *Gleditſia*; in the *Hortus Cliffortianus*, *Cæſalpinoides foliis pinnatis ac duplicato-pinnatis.* Micheli calls it *Melilobus*; Duhamel, *Gleditſia ſpinoſa*: Plukenet, *Acacia Americana, Abruæ folio, triacanthos*; and Cateſby, *Acacia, Abruæ folio, triacanthos, capſula ovali unicum ſemen claudente.*

Gleditſia is of the claſs and order *Polygamia Dioecia.*

The growth of the Acacia is naturally upright, and its trunk is guarded by thorns of three or four inches in length. Theſe thorns have alſo others coming out of their

with thorns; nor do the roots take ſuch hold of the ground, inſinuating, and running more like liquorice, and apt to emaciate the [illegible] therefore commend it for gardens, unleſs for the variety, of which there are ſeveral, ſome without thorns. They love to be planted in moiſt ground. CHAP. IV.

One thing more there is, which (for the uſe and benefit which theſe and the like exotics afford us) I would take hold of, as upon all occaſions I do in this work; namely, to encourage all imaginable induſtry of ſuch as travel foreign countries, and eſpecially Gentlemen who have concerns in our American plantations, to promote the culture of ſuch plants and trees, eſpecially timber, as may yet add to thoſe we find already agreeable to our climate in England. What we have ſaid of the Mulberry, and the vaſt emolument raiſed by the very leaves, as well as wood of that only tree, (beſides thoſe we now have mentioned, ſtrangers till of late, and believed *incicurable* here) were ſufficient to excite and ſtir up our utmoſt induſtry. Hiſtory tells us, the noble and fruitful country of France was heretofore

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ſides at nearly right angles: Their colour is red. The branches are ſmooth, and of a white colour. Theſe are likewiſe armed with red thorns, that are proportionally ſmaller: They are of ſeveral directions, and at the ends of the branches often ſtand ſingle. The young ſhoots of the preceding ſummer are perfectly ſmooth, of a reddiſh green, and retain their leaves often until the middle of November. Although there is a peculiar oddity in the nature and poſition of the ſpines, yet the leaves conſtitute the greateſt beauty of theſe trees: They are doubly pinnated, and of a delightful ſhining green. The pinnated leaves that form the duplication, do not always ſtand oppoſite by pairs on the middle rib; the pinnæ of which they are compoſed are ſmall and numerous; no leſs than ten or eleven pair belong to each of them; and as no leſs than four or five pair of ſmall leaves are arranged along the middle rib, the whole compound leaf conſiſts often of more than two hundred pinnæ of this fine green colour: They ſit cloſe, and ſpread open in fine weather; though at the approach of bad weather they will droop, and their upper ſurfaces nearly join, as if in a ſleeping ſtate. The flowers are produced from the ſides of the young branches in July: They are a greeniſh catkin, and make little ſhow; many are ſucceeded by pods, that have a wonderful effect; for theſe are exceeding large, more than a foot, and ſometimes a foot and a half in length, and two inches in breadth, and of a nut-brown colour when ripe.

There is a variety of this ſpecies, with fewer thorns, ſmaller leaves, and oval pods. It has nearly the reſemblance of the other; though the thorns being not ſo frequent, and the pods ſmaller, each containing only one ſeed, this ſort loſes that ſingular effect which the other produces by them.

The culture of theſe beautiful and noble trees is not very difficult. We receive the ſeeds from America in the ſpring, which keep well in the pods, and are for the moſt

BOOK II. thought ſo ſteril and barren, that, nothing almoſt proſpering in it, the inhabitants were quite deſerting it, and with their wives and children going to ſeek ſome other more propitious abode; when ſome of them happening to come into Italy, and taſting the juice of the delicious grape, the reſt of their countrymen took arms, and invaded the territories where thoſe vines grew, which they tranſplanted into Gallia, and have ſo infinitely improved ſince, that France alone yields more of that generous liquor than not only Italy and Greece, but all Europe and Aſia beſide: Who almoſt would believe that the auſtere Rheniſh, abounding on the fertile banks of the Rhine, ſhould produce ſo ſoft and charming a liquor, as does the ſame vine, planted among the rocks and pumices of the ſo remote and mountainous Canaries?

This for the encouragement and honour of thoſe who improve their countries with things of uſe and general benefit: Now, in the mean time, how have I beheld a floriſt, or meaner gardener, tranſported at the caſual diſcovery of a new little ſpot, double-leaf, ſtreak or daſh extraordinary in

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part good. They generally arrive in February; and, as ſoon as poſſible after, they ſhould be ſown in a well-ſheltered warm border of light ſandy earth. If no border is to be found that is naturally ſo, it may be improved by applying drift ſand, and making it fine. The ſeeds ſhould be ſown about half an inch deep; and they will, for the moſt part, come up the firſt ſpring. If the ſummer ſhould prove dry, they muſt be conſtantly watered; and if ſhade could be afforded them in the heat of the day, they would make ſtronger plants by the autumn. A careful attention to this article is peculiarly requiſite; for as the ends of the branches are often killed, if the young plant has not made ſome progreſs, it will be liable to be wholly deſtroyed by the winter's froſt, without protection; and this renders the ſowing the ſeeds in a warm border, under an hedge, in a well-ſheltered place, ſo neceſſary; for there theſe ſhrubs will endure our winters, even when ſeedlings, and ſo will require no farther trouble; nay, though the tops ſhould be nipped, they will ſhoot out again lower, and ſoon recover themſelves.

It will be proper to let them remain two years in the ſeed-bed, before they are planted out in the nurſery. The ſpring is the beſt time for the work. Their diſtance ſhould be one foot by two. The earth between the rows ſhould be dug every winter; and, being weeded in ſummer, the plants may remain, with no other particular care, until they are ſet out for good. Theſe trees are late in the ſpring before they exhibit their leaves, but keep ſhooting late in the autumn. They ſhould not only join in wilderneſs-quarters, with others of their own growth, but ſome of them ſhould be planted ſingly in opens, &c. where they will excite admiration, by their triple ſpines, fine leaves, and large pods.

a Tulip, Anemonie, Carnation, Auricula or Amaranth! cheriſhing and calling it by their own names, raiſing the price of a ſingle bulb to an enormous ſum, till a law was made in Holland to check that *Tulipamania*; the floriſt, in the mean time, priding himſelf as if he had found the Grand Elixir, or performed ſome notable atchievement, and diſcovered a new country.

This for the defects (for ſuch thoſe variegations produced by practice, or mixture, mangoniſms and ſtarving the root, are by chance met with now and then) of a fading flower: How much more honour then were due in juſtice to thoſe perſons, who bring in things of much real benefit to their country? eſpecially trees for fruit and timber; the Oak alone (beſides the ſhelter it afforded to our late Sovereign Charles II.) having ſo often ſaved and protected the whole nation from invaſion, and brought it in ſo much wealth from foreign countries. I have been told there was an intention to have inſtituted an Order of the Royal Oak; and truly I ſhould think it to become a Green Ribbon, next to that of St. George, ſuperior to any of the romantic badges, to which is paid ſuch veneration abroad, deſervedly to be worn by ſuch as have ſignalized themſelves by their conduct and courage, for the defence and preſervation of their country. Beſpeaking my reader's pardon for this digreſſion, we proceed in the next to other uſeful Exotics.

CHAP. V.

The CORK*, ILEX, ALATERNUS, CELASTRUS, LIGUSTRUM, PHILLYREA, MYRTLE, LENTISCUS, OLIVE, GRANATUM, SYRINGA, *and* JASMINE.

BOOK II. WE do not exclude this uſeful tree from thoſe of the glandiferous and foreſt; but being inclined to gratify the curious, I have been induced to ſay ſomething farther of ſuch *ſemper virentia*, as may be made to ſort with thoſe of our own.

SUBER. The Cork tree. Of this there are two ſorts, one of a narrow, or leſs jagged leaf, and perennial; the other of a broader, and falling in winter. It grows in the coldeſt parts in Biſcay, in the north of New-England, in the ſouth-weſt of France, eſpecially the ſecond ſpecies, fitteſt for our climate; and in all ſorts of ground, dry heaths, ſtony and rocky mountains, ſo as the roots will run even above the earth, where they have little to cover them; all which conſidered, methinks we ſhould not deſpair.

NOTES.

* QUERCUS *(Suber)* foliis ovato-oblongis indiviſis ſerratis ſubtus tomentoſis, cortice rimoſo fungoſo. Hort. Cliff. 448. *Oak, with oval, oblong, undivided leaves, which are ſawed and woolly on their under-ſide, and with a fungous cleft bark.* Suber latifolium ſempervirens. C. B. P. 424. *The Broad-leaved Evergreen Cork tree.*

It is of the claſs and order *Monoecia Polyandria.*

This is a timber-tree in Portugal and Spain, and other ſouthern parts of Europe, where it grows naturally. In the plantations made here, it ſhould be placed near the middle of the largeſt quarters, among others of about forty feet growth; and a few alſo ſhould be planted ſingly in opens, that the fungous bark may be in view; not that there is any great beauty merely in the ſight, but with us it is a curioſity, being the true Cork, and of the ſame nature with what comes from abroad. The bark on the trunk and main branches is rough and ſpongy; but on the young ſhoots it is ſmooth and gray, and on the youngeſt, white and downy. The leaves are of an oblong oval figure with ſawed edges. Their upper ſurface is ſmooth and of a ſtrong green colour, but their under is downy. They grow alternately on the branches, on very ſhort though ſtrong foot-ſtalks, and indeed differ in appearance very little from many



The Cork Tree

J. Miller del. & sculp.

We have ſaid where they grow plentifully in France; but by Pliny, (Nat. Hiſt. l. xvi. c. viii.) it ſhould ſeem they were ſince tranſplanted thither; for he affirms there were none either there or in Italy in his time: But I exceedingly wonder that Carolus Stephanus and Curſius ſhould write ſo peremptorily that there were none in Italy; where I myſelf have travelled through vaſt woods of them about Piſa, Aquin, and in divers tracts between Rome and the kingdom of Naples, and in France. The Spaniſh Cork is a ſpecies of Enzina, differing chiefly in the leaf, which is not ſo prickly, and in the bark, which is frequently four or five inches thick. The manner of decortication thereof, is once in two or three years to ſtrip it in a dry ſeaſon, otherwiſe the intercutaneous moiſture endangers the tree, and therefore a rainy ſeaſon is very pernicious; when the bark is off, they unwarp it before the fire, and preſs it even, and that with weights upon the convex part, and ſo it continues, being cold.

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ſorts of the Ilex. The flowers of this ſpecies of Oak make no ſhew——and the acorns, when ripe, are long, ſmooth, and of a brown colour.

There is a variety of this tree called the Narrow-leaved Cork tree. Its leaves are ſmaller, which qualifies it for a place in our plantations where variety is required.

The beſt Cork is taken from the oldeſt trees, the bark on the young trees being too porous for uſe. They are, nevertheleſs, barked before they are twenty years old; and this operation is neceſſary, to make way for a better bark to ſucceed, it being obſervable that, after every ſtripping, the ſucceeding bark encreaſes in value. They are generally peeled once in ten years, with an inſtrument for that purpoſe; and this is ſo far from injuring the trees, that it is neceſſary, and contributes to their being healthy; for without it they thrive but ſlowly; nay, in a few years they will begin to decay, and in leſs than a century a whole plantation will die of age; whereas thoſe trees that have been regularly peeled, will laſt upwards of two hundred years.

The bark of this tree was formerly uſed for making bee-hives; and Varro ſays, that thoſe which are made of this material are the beſt: "Optimæ fiunt corticeæ, deterrimæ fictiles, quod et frigore hyeme, et æſtate calore vehementiſſime hic commoventur." Virgil ſpeaking of providing commodious habitations for his bees, ſays,

Ipſa autem, ſeu *corticibus* tibi ſuta cavatis,
Seu lento fuerint alvearia vimine texta,
Anguſtos habeant aditus. GEORG. iv.

The bark of the Cork tree was by the antients called *Cortex*, by way of eminence: "Tu cortice levior." And Pliny ſays, the Greeks not inelegantly called this tree the Bark tree: "Non infacete Græci corticis arborem appellant."

Book II.

The uſes of Cork is well known amongſt us, both at ſea and land, for its reſiſting both water and air: the fiſhermen who deal in nets, and all who deal with liquors, cannot be without it: antient perſons prefer it before leather for the ſoles of their ſhoes, being light, dry, and reſiſting moiſture; whence the Germans name it Pantoffel-holts, (Slipper-wood) perhaps from the Greek παιλὸς & φέλλω; for I find it firſt applied to that purpoſe by the Grecian Ladies, whence they were called light-footed: I know not whether the epithet do ſtill belong to that ſex; but from them it is likely the Venetian Dames took it up for their monſtrous choppines; affecting or uſurping an artificial eminency above men, which nature has denied them. Of one of the ſorts of Cork are made pretty cups, and other veſſels, eſteemed good to drink out of for hectical perſons. The Ægyptians made their coffins of it, which being lined with a reſinous compoſition, preſerved their dead incorrupt. The poor people in Spain lay broad planks of it by their bed-ſide to tread on, (as great perſons uſe Turkey and Perſian carpets) to defend them from the floor, and ſometimes they line or wainſcot the walls and inſide of their houſes built of ſtone, with this bark, which renders them very warm, and corrects the moiſture of the air; alſo they employ it for bee-hives, an dto double the inſides of their contemplores and leather-caſes, wherein they put flaſqueras with ſnow to refrigerate their wine. This tree has beneath the Cortex, or Cork, two other coats, or libri, of which one is reddiſh, which they ſtrip from the bole when it is felled only, and this bears a good price with the tanner; the reſt of the wood is very good firing, and applicable to many other uſes of building, paliſade-work, &c. The aſhes drunk, ſtop the bloody-flux.

ILEX *.

Ilex major glandifera, or great Scarlet Oak, of ſeveral ſpecies, and various in the ſhape of their leaf, pointed, rounder, longer, &c. (a devoted tree of old, and therefore *incædua)* thrives manifeſtly with us; wit-

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* QUERCUS *(Ilex)* foliis ovato-oblongis indiviſis ſerratiſque petiolatis ſubtus incanis, cortice integro. Ilex folio anguſto non ſerrato. C. B. P. 424. *The narrow-leaved Evergreen Oak.*

The Ilex is of the claſs and order *Monoecia Polyandria.*

This is a well-known Evergreen, of which there are ſeveral varieties differing greatly in the ſize and ſhape of their leaves; but theſe will all ariſe from acorns of the

neſs his Majeſty's Privy-Garden at Whitehall, where once flouriſhed a goodly tree, of more than fourſcore years growth, and there was lately a ſickly imp of it remaining: And now very many raiſed by me have thriven wonderfully, braving the moſt ſevere winters, planted either in ſtandards or hedges, which they moſt beautifully become. The only difficulty is in their being dextrouſly removed out of the nurſery, with the mould adhering to the roots, otherwiſe they are apt to miſcarry; and therfore it is beſt truſting to the acorn for a goodly ſtandard, which may be removed without prejudice. Trials ſhould be made by graffing the Ilex on the Oak-ſtock, taken out of our woods, or better, grown from the acorn to the bigneſs of one's little finger.

By what I have touched in the chapter of the Elms, concerning the peregrination of that tree into Spain, (where even in Pliny's time there were none, and where now they are in great abundance) why ſhould we not more generally endeavour to propagate the Ilex amongſt us; I mean that which the Spaniards call the Enzina, and of which they have ſuch woods and profitable plantations? They are an hardy ſort of tree, and familiarly raiſed from the acorn, if we could have them ſound, and well put up in earth or ſand, as I have found by experience.

The wood of theſe Ilexes is ſerviceable for many uſes, as ſtocks of tools, mallet-heads, mall-balls, chairs, axle-trees, wedges, beetles, pins, and above all, for paliſadoes uſed in fortifications: Beſides, it affords ſo good fuel, that it ſupplies all Spain almoſt with the beſt and moſt laſting of charcoals in vaſt abundance. Of the firſt kind is made the painter's lac,

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ſame tree; nay, the lower and upper branches of the ſame tree are frequently garniſhed with leaves very different in ſize and ſhape from each other; thoſe on the lower branches being much broader, rounder, and their edges indented and ſet with prickles, but thoſe of the upper are long, narrow, and entire. The leaves of the Ilex are from three to four inches long, and one broad near the baſe, gradually leſſening to a point; they are of a lucid green on their upper ſide, but whitiſh and downy on their under, and are entire, ſtanding upon pretty long foot-ſtalks; theſe remain green all the year, and do not fall till they are thruſt off by young leaves in the ſpring. The acorns are ſmaller than thoſe of the common Oak, but of the ſame ſhape.

The Ilex major glandifera, mentioned by Mr. Evelyn, is the Smilax Arcadum glandifera major. Park. Theatr. 1396. Smilax Delachampii. *The Great Scarlet Oak.*

Book II. extracted from the berries; to ſpeak nothing of that noble confection alkermes, and that noble ſcarlet dye the learned Mr. Ray gives us the proceſs of at large, in his chapter of the Ilexes. To this add that moſt accurate deſcription of this tree and the Vermicula (ſee Quinqueranus, l. ii. de Laud. Provid. fol. 48) naturally abounding about Alos. The acorns of the Coccigera, or Dwarf Oak, yield excellent nouriſhment for ruſtics, ſweet, and little, if at all, inferior to the Cheſnut: and this, and not the Fagus, was doubtleſs the true Eſculus of the antients, the food of the Golden Age. The wood of the Enzina, when old, is curiouſly chambletted and embroidered with natural vermiculations, as if it were painted. Note, That the Kermes tree does not always produce the Coccum, but near the ſea, and where it is very hot; nor indeed when once it comes to bear acorns; and therefore the people do often burn down the old trees, that they may put forth freſh branches, upon which they find them. This (as well as the Oak, Cork, Beech, and Corylus) is numbered amongſt the felices and lucky trees, but for what reaſon the Alaternus, which I ſhall next ſpeak of, together with the Agrifolium (Holly), Pines, Salix, &c. ſhould be excommunicated, as infelices, I know not, unleſs for their being dedicated to the infernal deities; of which Macrob. Sat. lib. ii. c. xvi. In the mean time take this for a general rule, that thoſe were called infelices only, which bare no fruit; for ſo Livy, lib. v. *Nulla felix arbor, nihil frugiferum in agro relictum.* Whence that of Phœdrus, lib. iii. Fab. upon Jupiter's Eſculus,

O nata, merito ſapiens dicere omnibus:
Niſi utile eſt quod facimus, ſtulta eſt gloria.

Reciting the antient trees ſacred to the Deity, the moſt deſirable being thoſe that were fruitful, and for uſe.

ALATERNUS.

This tree, which we have lately received from the hotteſt parts of Languedoc, (and that is equal with the heat of almoſt any country in Europe) thrives with us in England, as if it were an indigene and natural; yet ſometimes yielding to a ſevere winter, followed with a tedious eaſtern wind in the ſpring, of all the enemies of our climate the moſt hoſtile and cruel; and therefore to be artificially and timely provided againſt with ſhelter.

I have had the honour to be the firſt who brought it into uſe and reputation in this kingdom, for the moſt beautiful and uſeful of hedges and

verdure in the world, the ſwiftneſs of the growth conſidered, and propagated it from Cornwall even to Cumberland: The ſeed grows ripe with us in Auguſt, and the honey-breathing bloſſoms afford an early and marvellous relief to the bees.

CELASTRUS *and* LIGUSTRUM.

Of theſe ſhrubs I ſhall ſay no more than that they are flexible and accommodate for topiary works.

PHILLYREA *.

The Phillyrea (of which there are five or ſix ſorts, and ſome variegated) is ſufficiently hardy, eſpecially the Seratifolia, which makes me wonder to find the Anguſtifolia planted in caſes, and ſo charily ſet into the ſtoves, amongſt the Oranges and Lemons; when, by long experience, I have found it equalling our Holly, in ſuffering the extremeſt rigours of our cruel froſts and winds, which, doubtleſs, of all our Engliſh trees, is the moſt inſenſible and ſtout.

They are (both Alaternus and this) raiſed of the ſeeds, (though thoſe of the Phillyrea will be long under ground) and being tranſplanted for eſpalier hedges or ſtandards, are to be governed by the ſheers, as oft as there is occaſion: The Alaternus will be up in a month or two after it is ſown. I was wont to waſh them out of the berry, and drying them in a little cloth, commit them to the nurſery-bed. Plant it out at two years growth, and clip it after rain in the ſpring, before it grows ſticky, and whilſt the ſhoots are tender; thus will it form an hedge (though planted but in ſingle rows, and at two feet diſtance) of a yard in thickneſs, twenty feet high, if you deſire it, and furniſhed to the bottom: But for an hedge of this altitude, it would require the friendſhip of ſome wall, or a frame of luſty poles, to ſecure againſt the winds one of the moſt delicious ob-

NOTES.

* Of the Phillyrea there are only three real ſpecies: 1. Oval-leaved Phillyrea.——2. Broad-leaved Phillyrea.——3. Narrow-leaved Phillyrea.——The Oval-leaved ſort has the following varieties: 1. Common Smooth-leaved Phillyrea.——2. Privet-leaved Phillyrea.——3. Olive-leaved Phillyrea. By ſome gardeners the Alaternus is miſtaken for the Phillyrea; but they are very different plants, the Phillyrea having two ſtamina only, and the Alaternus five. Beſides, the leaves of the Phillyrea ſtand oppoſite on the branches by pairs, but thoſe of the Alaternus ſtand ſingle, and are produced in an alternate manner.

Book II. jects in nature: But if we could have ſtore of the Phillyrea folio leviter ſerrato, (of which I have raiſed ſome very fine plants from the ſeeds) we might fear no weather, and the verdure is incomparable, and all of them tonſile, fit for cradle-work and Umbracula frondium.

MYRTLE*.

The vulgar Italian wild Myrtle (though not indeed the moſt fragrant) grows high, and ſupports all weathers and climates. They thrive abroad in Brittany, in places cold and very ſharp in winter; and are obſerved no where to proſper ſo well as by the ſea-coaſts, the air of which is more propitious to them, as well as to oranges and lemons, than the inland air. I know of one near eighty years old, which has been continually expoſed, unleſs it be, that in ſome exceeding ſharp ſeaſons, a little dry ſtraw has been thrown upon it; and where they are ſmitten, being cut down near the ground, they put forth and recover again; which many times they do not in pots and caſes, where the roots are very obnoxious to periſh with mouldineſs. The ſhelter of a few mats and ſtraw ſecured very great trees, both leaf and colour in perfection, this laſt winter alſo, which were planted abroad, whilſt thoſe that were carried into the Conſerve were moſt of them loſt. Myrtles, which are of ſix or eight ſorts, may be raiſed of ſeeds; but with great caution, and after all, ſeldom prove worth the pains, being ſo abundantly multiplied of ſuckers, ſlips, and layers. The double-flower, which is the moſt beautiful, was firſt diſcovered by the incomparable Fabr. Pereſhy, which a mule had cropt from a wild ſhrub. Note, That

NOTES.

* Of this moſt delicately looking ſhrub there are thirteen ſpecies deſcribed by Linnæus. The common kind is called Myrtus floribus ſolitariis: involucro diphyllo. Sp. Pl. 673. It is of the claſs and order *Icoſandria Monogynia*.

The common broad-leaved Myrtle is the hardieſt of all the kinds. The leaves are an inch and half long and one inch broad, of a lucid green, and ſtanding upon ſhort foot-ſtalks. The flowers are larger than the other ſorts, and come out from the ſides of the branches, on pretty long foot-ſtalks: Theſe are ſucceeded by oval berries of a dark purple colour, incloſing three or four hard kidney-ſhaped ſeeds. It flowers in July and Auguſt, and the berries ripen in winter. This is by ſome called the Flowering Myrtle.

Amongſt the antients every tree had its Protector. The Myrtle was favoured by Venus; but whether from the delicacy and elegance of its form, or its love to the ſea-ſhore, "amantes littora Myrtos," or any other cauſe, I ſhall not here attempt to decide.

you cannot give thoſe plants too much compoſt or refreſhing, nor clip them too often, even to the ſtem, which will grow tall, and proſper into any ſhape; ſo as arbours have been made of ſingle trees of the hardy kind, protected in the winter with ſheds of ſtraw and reeds. Both leaves and berries refrigerate, and are very aſtringent and drying, and therefore ſeldom uſed within, except in fluxes: The berries mitigate inflammations of the eyes, and conſolidate broken bones: a decoction of the juice, leaves, and berries dyes the hair black, *& enecat Vitiligenes*, as Dioſcorides ſays, lib. i. cap. cxxviii. There is an excellent ſweet water extracted from the diſtilled leaves and flowers.

The varieties of this rare ſhrub, now furniſhing the gardens and porticoes as long as the ſeaſon and weather ſuits, and even, in the ſevereſt winters, the conclave, are cut and contrived into various figures, and of divers variegations moſt likely to be produced by the ſeeds, as our learned Mr. Ray believes, rather than by layers, ſuckers, or ſlips, or from any difference of ſpecies. In the mean time, let gardeners make ſuch trials, whilſt thoſe moſt worth the culture are the Small and Broad-leaved, the Tarentine, the Belgick, Latifolia, and Double-flowered, and ſeveral more among the curious. The Myrtle, of old, was ſacred to Venus, and ſo called from a virgin beloved of Minerva. Garlands of the leaves and bloſſoms impaled the brows of *incruentous* victors at ovations. *

CANDLEBERRY.

And now if here, for the name only, I mention the Myrtus Braſantica, or Candleberry ſhrub, (which our plantations in Virginia and other places have in plenty) let it be admitted: It bears a berry which, being boiled in water, yields a ſuet or pinguid ſubſtance, of a green colour; after being ſcummed and taken off, they make candles with this, in the ſhape of ſuch as we uſe of tallow, or wax rather; giving not only a very clear and ſufficient light, but a very agreeable ſcent: thoſe are now frequently brought hither to us, as alſo the tree itſelf, of which I have ſeen a thriving one.

NOTES.

* A Myrtle crown was worn by the General to whom an OVATION was decreed, but at a TRIUMPH the Victor always wore a Laurel one. The reaſon of this is given by Plutarch in the Life of Marcellus, viz. That as an OVATION was decreed for ſome remarkable ſucceſs obtained by treaty, or without much blood-ſhed, it was proper that the General at his public appearance ſhould be crowned with the tree ſacred to Venus, who, of all the Deities, was ſuppoſed to be the moſt averſe to the horrors of war.

LENTISCUS.

Book II. This is a very beautiful Evergreen, and refuſes not our climate when protected with a little ſhelter: it is propagated by ſuckers and layers. Of this tree are made the beſt tooth-pickers in the world, and the maſtic, or gum, produced from it, is of excellent uſe in faſtening the gums.

OLIVE.

As the Lentiſc, ſo may the Olive be admitted, though it produce no other fruit than the verdure of the leaf; nor will it kindly breathe our air; nor the leſs tender Oleaſter *, without the indulgent winter-houſe take them in.

GRANATUM †. *MALUS PUNICA.*

This is nothing ſo nice. There are of this glorious ſhrub three ſorts, eaſily enough educated under any warm ſhelter, even to the raiſing hedges

NOTES.

* The title of the Oleaſter, or Wild Olive, is, *Elæagnus foliis lanceolatis.* In the *Hortus Cliffortianus* it is termed ſimply, *Eleagnus.* Caſpar Bauhine calls it, *Olea ſylveſtris, folio molli incano.* It grows naturally in Bohemia, Spain, Syria, and Cappadocia.

It is of the claſs and order *Tetrandria Monogynia.*

This tree will grow to near twenty feet in height. The branches are ſmooth, and of a brown colour. The preceding year's ſhoots are white and downy, and the ſilvery leaves are placed irregularly on them: Theſe are of a ſpear-ſhaped figure, about two, and ſometimes three inches long, and three quarters of an inch broad, and are as ſoft as ſattin to the touch. Neither is ſummer the only time the leaves afford us pleaſure: They continue on the tree great part of the winter. The flowers appear in July, but make no figure: They are ſmall, and come out at the foot-ſtalks of the leaves; their colour is white, and they are poſſeſſed of a ſtrong ſcent. The fruit that ſucceeds them much reſembles a ſmall Olive. Of this ſhrub there is a variety with yellow flowers.

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† Of this Genus there are two Species.

1. PUNICA *(Granatum)* foliis lanceolatis, caule arboreo. Hort. Cliff. 134. *Pomegranate with linear ſpear-ſhaped leaves, and a tree-like ſtalk.* Malus Punica Sativa. B. P. 438. *The Pomegranate.*

This tree is now pretty common in the Engliſh gardens, where formerly it was nurſed up in caſes, and preſerved in green-houſes with great care (as was alſo the

of them, nor indeed affects it ſo much heat, as plentiful watering. They ſupported a very ſevere winter in my garden, 1663, without any trouble or artifice; and if they preſent us their bluſhing double flowers for the pains of reciſion and well prunning, (for they muſt diligently be purged of ſuperfluous wood) it is recompence enough; though placed in a very benign aſpect, they have ſometimes produced a pretty ſmall pome. It is a Perdifolia in winter, and growing abroad, requires no extrordinary rich earth, but that the mould be looſened and eaſed about the root, and hearty compoſt applied in ſpring and autumn: Thus cultivated, it will riſe to a pretty tree, though of which there is in nature none ſo adulterate a ſhrub. It is beſt increaſed by layers, approach and inarching, as they term it, and is ſaid to marry with Laurels, the Damſon, Aſh, Almond, Mulberry, Citron, too many I fear to hold. But, after all, they do beſt being caſed, the mould well mixt with rotten hogs dung, its peculiar delight, and kept to a ſingle ſtem, and treated like other plants in the winter ſhelter; they open the bud and flower, and ſometimes with a pretty ſmall fruit; the

NOTES.

double flowering kind); but they are both hardy enough to reſiſt the ſevereſt cold of our climate in the open air; and, if planted againſt warm walls in a good ſituation, the firſt ſort will often produce fruit, which in warm ſeaſons will ripen tolerably well; but as theſe fruits do not ripen till late in the autumn, they are ſeldom well taſted in England, for which reaſon the ſort with double flowers is commonly preferred. Of this ſpecies there are the following varieties: 1. The Wild Pomegranate with ſingle and double flowers.—2. The Sweet Pomegranate. 3. The Small Flowering Pomegranate with ſingle and double flowers.——4. The Pomegranate with ſtriped flowers.

The double flowering kind is moſt eſteemed in this country for the ſake of its large, fine, double flowers, which are of a moſt beautiful ſcarlet colour; and, if the trees are ſupplied with nouriſhment, will continue to produce flowers for two months ſucceſſively, which renders it one of the moſt valuable flowering trees yet known

2. PUNICA *(Nana)* foliis linearibus, caule fruticoſo. *Pomegranate with linear leaves, and a ſhrubby ſtalk.* Punica Americana nana ſeu humillima. Tourn. Inſt. 636. *The American Dwarf Pomegranate.*

This ſort grows naturally in the Weſt-Indies, where the inhabitants plant it in their gardens to form hedges. It ſeldom riſes more than five or ſix feet high in thoſe countries, ſo may be kept within compaſs, and there the plants continue flowering great part of the year. The flowers of this kind are much ſmaller than thoſe of the common ſort; the leaves are ſhorter and narrower, and the fruit is not larger than a nutmeg, and has little flavour, ſo it is chiefly propagated for the beauty of its flowers.

Book II. juice whereof is cooling, and the reſt of an aſtringent quality. The rind may alſo ſupply the gall for making ink, and will tan leather.

SYRINGA *. *LILAC.*

This is eaſily propagated by ſuckers or layers; the flower of the white, (emulating both the colour and flavour of the Orange) I am told, is made uſe of by the perfumers, I ſhould not elſe have named it among the Evergreens; for it loſes the leaf, though not its life, however expoſed in the winter: There are beſides this the Purple, by our botaniſts called the Perſian Julſamine, which leads me to the other Jaſmines.

JASMINE.

This, eſpecially the Spaniſh larger flower, far exceeds all the other ſweet-ſmelling ſhrubs for the agreeable odour and uſe of the perfumer: The common White and Yellow will flower plentifully in our groves, and climb about the trees, being as hardy as any of our Periclimena and Honey-ſuckles.

How it is increaſed by ſubmerſion and layers, every gardener ſkills; and were it as much employed for noſegays, &c. with us, as it is in Italy and France, they might make money enough of the flowers; one ſorry tree in Paris, where they abound, has been worth to a poor woman near a piſtole a year.

There is no ſmall curioſity and addreſs in obtaining the oil, or eſſence, as we call it, of this delicate and evanid flower, which I leave to the Chemiſt and the Ladies, who are worthy the ſecret.

NOTES.

* Though the varieties of this tree are numerous, the real diſtinct ſpecies are only two.

1. SYRINGA *(Vulgaris)* foliis ovato-cordatis. Hort. Cliff. 6. *Syringa with oval heart-ſhaped leaves.* Syringa cærulea. B. P. 398. *Blue Syringa. The Blue Lilac.*

2. SYRINGA *(Perſica)* foliis lanceolatis. Lin. Sp. Pl. 11. *Syringa with ſpear-ſhaped leaves.* Lilac folio Liguſtri Tourn. Inſt. 602. *Lilac with a Privet leaf*, commonly called *Perſian Jaſmine.*

Syringa is of the claſs and order *Diandria Monogynia.*

Both theſe kinds, together with their varieties, are beſt propagated by layers. The firſt ſort may be raiſed from the ſeeds, which ripen in autumn.



The Strawberry Tree.

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J. & Miller del et Sculp.

CHAP. VI.

The ARBUTUS*, BOX, YEW, HOLLY, LAUREL, *and* BAY.

CHAP. VI.

ARBUTUS. The Strawberry-tree. This is, I think, too much neglected by us, making that a rarity which grows ſo common and naturally in Ireland: It is indeed with ſome difficulty raiſed by ſeeds, but eaſily propagated by layers; if ſkilfully pruned, it grows to a goodly tree,

NOTES.

* Of this genus there are five ſpecies.

1. ARBUTUS *(Unedo)* foliis glabris ſerratis, baccis polyſpermis, caule erecto arboreo. *Strawberry-tree with ſmooth ſawed leaves, berries having many ſeeds, and an upright trunk.* Arbutus folio ſerrato. C. B. P. 460. Arbutus. Cam. Epit. 168.

This ſort grows naturally in Italy, Spain, and alſo in Ireland, and is now very common in the Engliſh gardens. It produces the following varieties, viz. one with an oblong flower and oval fruit; another with a double flower; and a third with red flowers.

2. ARBUTUS *(Andrachne)* foliis glabris integerrimis, baccis polyſpermis, caule erecto arboreo. Lin. Sp. Pl. 566. *Strawberry tree with ſmooth entire leaves, berries full of ſeeds, and an erect woody ſtem.* Arbutus folio non ſerrato. C. B. P. 46. Andrachne Theophraſti. Cluſ. Hiſt. 48. Called *Andrachne.*

This kind grows naturally in the eaſt, particularly about Magneſia, where it is ſo plenty, as to be the principal fuel uſed by the inhabitants of the country. This grows to a middle-ſized tree; the branches are irregular, and are garniſhed with large oval leaves, ſomewhat like thoſe of the Bay tree, but not quit ſo long; theſe are ſmooth and entire, having no ſerratures on their edges; the flowers are ſhaped like thoſe of the common Arbutus, but grow thinly on the branches. The fruit is oval, and of the ſame colour and conſiſtence with the common ſort, but the ſeeds of this are flat, whereas thoſe of the common ſort are pointed and angular.

3. ARBUTUS *(Acadienſis)* caulibus procumbentibus, foliis ovatis ſubſerratis floribus ſparſis, baccis polyſpermis. Lin. Sp. Pl. 566. *Arbutus with trailing ſtalks, oval leaves, ſomewhat indented, flowers growing looſely, and many ſeeds.* Vitis idæa Acadienſis, foliis Alaterni. Tourn. Inſt.

This ſort grows naturally in Acadia, and other northern parts of America, upon ſwampy land, which is frequently overflowed with water; this is a low buſhy ſhrub, with ſlender trailing branches, which are garniſhed with oval leaves, a

Book II. patient of our clime, unleſs the weather be very ſevere; it may be contrived into moſt beautiful paliſades, and is ever verdant: I am told the tree grows to a huge bulk and height on mount Athos and in other countries.

NOTES.

little ſawed on their edges; the flowers come out from the wings of the leaves, growing in thin looſe bunches. The fruit of this ſort is never produced in England, and it is with great difficulty the plants are kept alive here.

4. ARBUTUS *(Alpina)* caulibus procumbentibus, foliis rugoſis ſerratis. Flor. Lap. 161. *Arbutus with trailing ſtalks and rough ſawed leaves.* Vitis idæa foliis oblongis albicantibus. C. B. P. 470. Vitis idæa. Cluſ. Hiſt.

This grows naturally on the Alps and the Helvetian mountains. It never riſes high, but ſends out from the root many ſlender branches, which trail upon the ground, garniſhed with oblong rough leaves, of a pale green colour; the flowers are produced from the wings of the leaves, upon long ſlender foot-ſtalks, and are ſucceeded by berries about the ſize of the common black Cherry, which are firſt green, afterwards red, and when ripe are black. Theſe are of a pleaſant taſte, ſo are frequently eaten by the inhabitants of thoſe countries where they grow naturally. This is a very difficult plant to keep alive in gardens, for it is an inhabitant of bogs, growing among moſs, where the ground is never dry.

5. ARBUTUS *(Uva Urſi)* caulibus procumbentibus, foliis integerrimis. Flor. Lap. 162. *Arbutus with trailing ſtalks and entire leaves.* Uva Urſi. Cluſ. Hiſt.

This grows naturally upon the mountains in Spain, and in moſt of the northern parts of Europe. The branches trail on the ground, which are cloſely garniſhed with ſmooth thick leaves of an oval form, placed alternately; the flowers are produced in ſmall bunches toward the extremity of the branches, which are ſhaped like thoſe of the common ſort, but ſmaller; and are ſucceeded by berries, of the ſame ſize with thoſe of the former ſort, which are red when ripe.

Arbutus is of the claſs and order *Decandria Monogynia.*

The common Strawberry tree is well known, being at preſent in moſt of the Engliſh gardens, and one of their greateſt ornaments in the months of October and November, that being the ſeaſon when the trees are in flower, and the fruit of the former year is ripe, for the fruit is a whole year growing to perfection; ſo that the fruit which is produced from the flowers of one year, do not ripen till the bloſſoms of the ſucceeding year are fully blown; when there is plenty of fruit and flowers upon the trees they make a fine appearance, and at a ſeaſon when moſt other trees are paſt their beauty.

——————— pomoque onerata rubenti
Arbutus. OVID.

Thoſe trees which have large oval fruit, make the greateſt figure, their flowers being larger, and oblong. The ſort with double flowers is a curioſity; but as the

Virgil reports its inoculation with the nut. Bauhinus commends the coal for the goldſmiths' works; and the Poet, CHAP. VI.

Arbuteæ crates, & myſtica Vannus Iacchi. GEORG. i.

Arbutean harrows, and the myſtick van.

NOTES.

flowers have only two orders of leaves, ſo they make no great appearance; nor do the trees produce fruit in any plenty, therefore the other is preferable. The ſort with red flowers makes a pretty variety, when intermixed with the other; for the outſides of them are of a fine red colour at their firſt appearance, and afterward they change to purple before they fall off. The fruit of this is the ſame with the common ſort. All theſe varieties are preſerved by inarching or grafting them upon the common Arbutus, for the ſeeds of either do not produce the ſame kind; though from the ſeeds of the oval fruit, there are generally many more of the ſame produced, than from the ſeeds of the common ſort.

The beſt method to propagate the Arbutus is from ſeeds; therefore when the fruit is perfectly ripe, it ſhould be gathered and mixed with dry ſand, to preſerve it till the time for ſowing; the ſureſt method of raiſing the plants, is to ſow the ſeeds in pots, which ſhould be plunged into an old bed of tanners' bark, which has loſt its heat, covering the bed with glaſſes, &c. to keep out the froſt; this ſhould be done in December; if the ſeeds are good, and as the ſpring advances the pots are refreſhed with water, the plants will come up the beginning of April, when they ſhould be frequently but ſparingly watered, and conſtantly kept clean from weeds.

As the ſummer advances, if the plants are ſhaded in the heat of the day, it will greatly promote their growth; but in warm weather they muſt be open all night to receive the dew, ſo ſhould only be covered in the middle of the day: with this management the plants will riſe to the height of five or ſix inches the firſt ſummer.

The fruit of the Arbutus is ſaid to have conſtituted part of the food of mankind in the early ages, "Arbuteos fœtus montanaque fragra legebant;" though of all the wild fruits it muſt have been the moſt diſguſting. The antients themſelves named it *Unedo*, and Pliny gives the reaſon, "cui nomen ex argumento ſit unum tantum edendi." However diſagreeable the fruit may have been, its ſhade was thought inviting. Horace ſays of it,

Nunc viridi membra ſub Arbuta ſtratus.

But Virgil, who was as good a judge, deſcribes its foliage as rather thin:

Et quæ vos rara viridis tegit Arbutus umbra. ECL. vii.

BOX*.

BUXUS. The Box. This we begin to proſcribe our gardens, (and indeed bees are no friend to it) tho' it ſhould not yet be baniſhed from our care, becauſe the excellency of the wood does commute for the diſagreeableneſs of its ſmell: Therefore let us furniſh our cold and barren hills and declivities with this uſeful ſhrub, I mean the taller ſort; for dwarf and more tonſile in due place. It will increaſe abundantly of ſlips ſet in March, and towards Bartholomew-tide, as alſo of the ſeeds contained in the cells. Theſe trees riſe naturally at Boxley in Kent in abundance, and the county of Surry, giving name to that chalky hill (near the famous Mole or Swal-

NOTES.

* Of the Box there is only one ſpecies, and in the Sp. Pl. it ſtands ſimply with the name BUXUS. There are, however, many varieties.

It is of the claſs and order *Monoecia Tetrandria.*

The Box tree is propagated from cuttings put down in autumn, and kept wat[illegible] till they have ſtruck root. It may alſo be raiſed from ſeeds ſown ſoon after th[illegible]pe in a ſhady border, and well watered in dry weather.

This tree grows luxuriantly, and in great abundance, upon Box-hill, at Darking in Surry, which place may be ſaid to rival Virgil's Cytorus:

Et juvat undantem buxo ſpectare Cytorum. GEORG. ii.

The Box tree makes a fine and chearful appearance in Evergreen quart[illegible]rs.——— When cut down, the wood ſells at a high price; a ſufficient encouragement for the planter to raiſe it for ſale.

This beautiful Evergreen was much eſteemed by the antients for uſe as well as ornament. They made combs of it as we do at this day.

Multifido Buxus quæ tibi dente datur. MART.

They alſo formed it into muſical inſtruments to be played upon by the mouth.

Si buxos inflare juvat ——————— VIRG.

——————— non illos carmina vocum,
Longave multifori delectat tibia *buxi*. OVID

Among the Romans theſe trees were clipped into various forms, a practice quite exploded by our modern improvers in gardening. Martial, in his deſcription of Ba[illegible]us's country-houſe, lets us into the taſte of the Roman gardens: Theſe, ſays he, contain Myrtles, Box, and Plane trees.

——————— otioſis ordinata myrtetis,
Viduaque platano, *tonſilique buxeto*. Epig. Lib. iii.

low) whither the Ladies, Gentlemen, and other water-drinkers from the neighbouring Ebeſham Spaw, often reſort during the heat of ſummer to walk, collation, and divert themſelves in thoſe antilex natural alleys and ſhady receſſes, among the Box trees, without taking any ſuch offence at the ſmell which has of late baniſhed it from our groves and gardens; when, after all, it is infinitely to be preferred for the bordering of flower-beds and flat embroideries, to any ſweeter leſs-laſting ſhrub whatever, ſubject, after a year or two, to grow dry, ſticky, and full of gaps; which Box is ſo little obnoxious to, that, braving all ſeaſons, it needs not to be renewed for twenty years together, nor kept in order with the garden-ſheers above once or twice a year; and immediately upon that, the caſting water upon it, hinders all thoſe offenſive emiſſions which ſome complain of. But whilſt I ſpeak in favour of this ſort of edging, I only recommend the uſe of the Dutch Box, (rarely found growing in England) which is a pumil dwarf kind, with a ſmaller leaf, and ſlow of growth, and which needs not be kept above two inches high, and yet grows ſo cloſe, that beds bordered with boards keep not the earth in better order; beſide, the pleaſantneſs of the verdure is incomparable.

One thing more I think fit to add; that it may be convenient once in four, five, or ſix years, to cut off the ſtrings and roots which ſtraggle into the borders, with a very ſharp ſpade, that they may not prejudice the flowers, and what elſe one plants in them.

I need not ſpeak much of the uſes of this tree, (growing in time to conſiderable ſtature) ſo continually ſought after for many utenſils, being ſo hard, cloſe, and ponderous as to ſink like lead in water; and therefore of ſpecial uſe for the Turner, Engraver, Carver, Mathematical Inſtrument, Comb, and Pipe-maker (*Si buxos inflare juvat* ——— Claud.) who give great prices for it by weight, as well as meaſure; and by the ſeaſoning, and divers manner of cutting, vigorous inſolations, poliure and grinding, the roots of this tree (as of even our common and neglected thorn) do furniſh the Inlayer and Cabinet-makers with pieces rarely undulated, and full of variety: Alſo of Box are made wheels or ſhivers, as our Ship-carpenters call them, and pins for blocks and pulleys; pegs for muſical inſtruments; nut-crackers, weavers' ſhuttles, hollar-ſticks, bump-ſticks, and dreſſers for the ſhoemaker, rulers, rolling-pins, peſtles, mall-

Book II. balls, beetles, tops, tables, chefs-men, ſcrews, male and female, bobins for bone-lace, ſpoons, nay the ſtouteſt axle-trees; but above all,

——————————— non ultima belli
Arma Puellaris; Laqueos hæc nectit Amantûm,
Et venatricis diſponit retia Formæ. Couleii Pl. Lib. vi.

——— Box combs bear no ſmall part
In the militia of the female art;
They tie the links which hold our gallants faſt,
And ſpread the nets to which fond lovers haſte.

The chemical oil of this wood has done the feats of the beſt guaiacum (though in greater quantity) for the cure of venereal diſeaſes, as one of the moſt expert Phyſicians in Europe has confeſſed. The oil aſſuages the tooth-ach. But, ſays Rhodoginus, the honey which is made at Treviſond in Box trees (I ſuppoſe he means gathered among them; for there are few, I believe, if any, ſo large and hollow as to lodge and hive bees) renders them diſtracted who eat of it. Lib. xxiii. cap. xxv.

YEW *.

Since the uſe of bows is laid aſide amongſt us, the propagation of the Yew tree (of which we have two ſorts, and other places reckon more, as the Arcadian Black and Red; the Yellow of Ida, infinitely eſteemed of old) is likewiſe quite forborn; but the neglect of it is to be deplored;

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* We have but one Species of this tree in England, viz.

Taxus (*Baccata*) foliis approximatis. Lin. Sp. Plant. 1472. *Yew tree with leaves growing near each other. The common Yew.*

It is of the claſs and order *Dioecia Monodelphia.*

This tree grows naturally in England, and alſo in moſt of the nothern countries of Europe, and in North-America. If ſuffered to grow, it will riſe to a good height, with a very large ſtem. It naturally ſends out branches on every ſide, which ſpread out, and are almoſt horizontal; theſe are cloſely garniſhed with narrow, ſtiff, blunt-pointed leaves, of a very dark green. The flowers come out from the ſide of the branches in cluſters; the male flowers having many ſtamina, are more conſpicuous



The Yew tree.

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ſeeing that (beſides the rarity of it in Italy and France, where but little of it grows) the barreneſt grounds, and coldeſt of our mountains CHAP. VI.

——— Aquilonem & frigora taxi.

might be profitably repleniſhed with them: I ſay, profitably; for, beſides the uſe of the wood for bows,

——— Ityræos taxi torquentur in arcus.

(for which the cloſe and more deeply dyed is beſt) the forementioned artiſts in Box, Cabinet-makers, and Inlayers (particularly for Parquetè-floors) moſt gladly employ it; and in Germany they uſe to wainſcot their ſtoves with boards of this material: alſo for the cogs of mills, poſts to be ſet in moiſt grounds, and everlaſting axle-trees, there is none to be compared with it; likewiſe for the bodies of lutes, theorboes, bowls, wheels, and

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than the female; theſe for the moſt part are upon different trees, but ſometimes are upon the ſame tree; they appear the latter end of May, and the berries ripen in autumn.

The Yew tree has been generally cultivated for the pleaſure-garden, both to clip into the figures of beaſts, birds, &c. and alſo for hedges. Whoever is pleaſed with ſuch figures in his garden, can raiſe no tree more proper for his purpoſe, as the branches and the leaves may be clipped and faſhioned into almoſt any form or ſhape. But as this method is juſtly exploded, and as every one who has the leaſt pretenſion to taſte muſt always prefer a tree in its natural growth to thoſe monſtrous figures, the Yew is now chiefly planted for wilderneſs quarters, as alſo for hedges, for which ſervice it is excellently well adapted, as no tree bears clipping ſo well.

Theſe trees may be eaſily propagated by ſowing their berries in autumn, as ſoon as they are ripe, (without clearing them from the pulp which ſurrounds them, as hath been frequently directed) upon a ſhady bed of freſh undunged ſoil, covering them over about half an inch thick with the ſame earth.

In the ſpring the bed muſt be carefully cleared from weeds, and if the ſeaſon proves dry, it will be proper to refreſh the bed with water now and then, which will promote the growth of the ſeeds, many of which will come up the ſame ſpring, but others will remain in the ground until autumn or the ſpring following; but where the ſeeds are preſerved above ground till ſpring before they are ſown, the plants never come up till the year after; ſo that by ſowing the ſeeds as ſoon as they are ripe, there is often a whole year ſaved.

Theſe plants, when they come up, ſhould be conſtantly cleared from weeds, which, if permitted to grow amongſt them, will cauſe their bottoms to be naked, and frequently deſtroy the plants when they continue long undiſturbed.

In this bed the plants may remain two years; after which, in autumn, there ſhould be a ſpot of freſh undunged ſoil prepared, into which they ſhould be removed the be-

BOOK II. pins for pulleys; yea, and for tankards to drink out of: Whatever Pliny reports concerning its ſhade, and the ſtories of the air about Thaſius, the fate of Cativulcus, mentioned by Cæſar, and the ill report which the fruit has vulgarly obtained in France, Spain, and Arcadia: But,

Quam multa arboribus tribuuntur crimina falſa?
How are poor trees traduc'd?

The toxic quality was certainly in the liquor, which thoſe good fellows tippled out of thoſe bottles, not in the nature of the wood; which yet he affirms is cured of that venenous quality, by driving a brazen wedge into the body of it. This I have never tried, but that of the ſhade and fruit I have frequently, without any deadly or noxious effects: ſo that I am of opinion, that the tree which Seſtius calls Smilax, and our Hiſtorian thinks to be our Yew, was ſome other wood; and yet I acknowledge that it is eſteemed noxious to cattle when it is in the ſeeds, or newly ſprouting; though I marvel there appears no more ſuch effects of it, both horſes and other cattle being free to brouſe on it, where it naturally grows: But what is very odd, if true, is that which the late Mr. Aubrey recounts (in his

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ginning of October, planting them in beds about four or five feet wide, in rows about a foot aſunder, and the ſame diſtance from each other in the rows, obſerving to lay a little mulch upon the ſurface of the ground about their roots, as alſo to water them in dry weather until they have taken root; after which they will require no farther care, but to keep them clear from weeds in ſummer, and to trim them according to the purpoſe for which they are deſigned.

In theſe beds they may remain two or three years, according as they have grown, when they ſhould again be removed into a nurſery, placing them in rows at three feet diſtance, and the plants eighteen inches aſunder in the rows; obſerve to do it in autumn, as was before directed, and continue to trim them in the ſummer ſeaſon, according to the deſign for which they were intended; and after they have continued three or four years in this nurſery, they may be tranſplanted where they are to remain; always obſerving to remove them in autumn where the ground is very dry, but on cold moiſt land it is better in the ſpring.

Theſe trees, tho' of ſlow growth, do ſometimes arrive at a conſiderable ſize. Mr. Pennant mentions one in Fontingal church-yard, in the Highlands of Scotland, whoſe trunk meaſured fifty-ſix feet and a half in circumference.

Of the Yew there is a variety with ſhort leaves, which appear very ornamental in plantations. There is alſo another with ſtriped leaves of great value amongſt the variegated tribes. Theſe are increaſed by layers, but the ſtriped ſort muſt be planted upon a barren ſoil, otherwiſe it will become plain.

Miſcellanies) of a Gentlewoman that had long been ill, without any benefit from the Phyſician; ſhe dreamed that a friend of her's, deceaſed, told her mother, that if ſhe gave her daughter a drink of Yew pounded, ſhe ſhould recover; it was accordingly given her, and ſhe preſently died. The mother being almoſt diſtracted for the loſs of her daughter, her chamber-maid, to comfort her, ſaid, Surely, what ſhe gave her was not the occaſion of her death, and that ſhe would adventure on it herſelf; ſhe did ſo, and died alſo! Whether all this be but a dream, I cannot tell, but it was haply from theſe lugubrous effects, that garlands of Taxus were uſually carried at funerals, as Statius implies in Epicedium Vernæ: However, to prevent all funeſt accidents, I commend the tree only for the uſefulneſs of the timber, and hortulan ornament. That we find it ſo univerſally planted in our church-yards, was, doubtleſs, from its being thought a ſymbol of immortality, the tree being ſo laſting, and always green. Our bee-maſters baniſh it from about their apiaries.

One thing more, whilſt I am ſpeaking of this tree: It minds me of that very odd ſtory I find related by Mr. Cambden, of a certain amorous clergyman, that falling in love with a pretty maid, who refuſed his addreſſes, cut off her head; which being hung upon a Yew tree till it was rotten, the tree was reputed ſo ſacred, not only whilſt the virgin's head hung on it, but as long as the tree itſelf laſted; to which the people went in pilgrimage, plucking and bearing away branches of it, as an holy relick, whilſt there remained any of the trunk, perſuading themſelves, that thoſe ſmall fine veins and filaments (reſembling hairs between the bark and the body of the tree) were the hairs of the virgin: But what is yet ſtranger, the reſort to this place, (then called Houton, a deſpicable village) occaſioned the building of the now famous town of Halifax, in Yorkſhire, which imports *Holy Hair*. By this, and the like, may we eſtimate what a world of impoſtures have, through craft and ſuperſtition, gained the repute of holy places, abounding with rich oblations (their Devotas).—— Pliny ſpeaks of an old Lotus tree in a grove near Rome, upon which the Veſtals preſent (as our Nuns) were uſed to hang their hair cut off at their profeſſion. Lib. xvi. cap. xliii.

I may not in the mean time omit what has been ſaid of the true Taxus of the antients, for being a mortiferous plant. Dr. Beiluccio, Preſident of the Medical Garden at Piſa in Tuſcany, (where they have this curioſity) affirms, that when his gardeners clip it, as ſometimes they do, they are

Book II. not able to work above half an hour at a time, it makes their heads ſo ake: But the leaves of this tree are more like the Fir, and is very buſhy, furniſhed with leaves from the very root, and ſeeming rather an hedge than a tree, though it grows very tall.

This Engliſh Yew tree is eaſily produced of the ſeeds, waſhed and cleanſed from their mucilage, then buried and dried in ſand a little moiſt, any time in December, and ſo kept in ſome veſſel in the houſe all winter, and in ſome cool ſhady place abroad all the ſummer; ſow them the ſpring after. Some bury them in the ground like Haws; it will commonly be the ſecond winter before they peep, and then they riſe with their caps on their heads. Being three years old, you may tranſplant them, and form them into ſtandards, knobs, walks, hedges, &c. in all which works they ſucceed marvellous well, and are worth our patience for their perennial verdure and durableneſs. I do again name them for hedges, preferable, for beauty and a ſtiff defence, to any plant I have ever ſeen, and may, upon that account, without vanity, be ſaid to have been the firſt who brought it into faſhion, as well for defence, as for a ſuccedaneum to Cypreſs, whether in hedges or pyramids, conic-ſpires, bowls, or what other ſhapes, adorning the parks or larger avenues with their lofty tops, thirty feet high, and braving all the efforts of the moſt rigid winter, which Cypreſs cannot weather. I have ſaid how long laſting they are, and eaſily to be ſhaped and clipped; nay, when cut down, they thrive: But thoſe which are moſt ſuperannuated, and perhaps of many hundred years ſtanding, periſh if ſo uſed.

He that in winter ſhould behold ſome of our higheſt hills in Surry clad with whole woods of theſe two laſt ſorts of trees, for divers miles in circuit (as in thoſe delicious groves of them, belonging to the Honourable, my Noble Friend, the late Sir Adam Brown, of Bechworth Caſtle) from Box-Hill, might, without the leaſt violence to his imagination, eaſily fancy himſelf tranſported into ſome new or enchanted country; for, if in any ſpot of England,

> Hic ver aſſiduum, atque alienis menſibus æſtas. VIRG.
>
> ——————————— 'tis here
> Eternal ſpring and ſummer all the year.

Of which I have already ſpoken in the former Section.



The Holly Tree.

Painted by Miss Pratt. Engraved by W. Hooker as the Act directs.

W. & H. Hooker Sc.

HOLLY *.

CHAP. VI.

Above all the natural greens which inrich our home-born ſtore, there is none certainly to be compared to the Agrifolium (or Acuifolium rather) our Holly, ſo ſpontaneouſly growing here in this part of Surry, that the large Vale near my own dwelling, was antiently called Holmes-Dale, famous for the flight of the Danes: The inhabitants (of great antiquity in their manners, habits, and ſpeech) have a proverb, *Holmes-Dale never won; ne, never ſhall.* It had once a fort, called Holmes-Dale Caſtle: I know not whether it might not be that of Rygate; but leaving this uncertain, I return to the plant. I have often wondered at our curioſity after foreign plants, and expenſive difficulties, to the neglect of the culture of this

NOTES.

* Of the Ilex there are five Species, but I ſhall only take notice of two.

1. ILEX *(Aquifolium)* foliis ovatis acutis ſpinoſis. Hort. Cliff. 40. Ilex aculeata baccifera. C. B. P. 425. *Prickly berry-bearing Ilex. The common Holly.*

The common Holly grows naturally in woods and foreſts in many parts of England, where it riſes from twenty to thirty feet high, and ſometimes more, but the ordinary height is not above twenty-five feet. The ſtem by age becomes large, and is covered with a grayiſh ſmooth bark; and thoſe trees which are not lopped or browſed by cattle, are commonly furniſhed with branches the greateſt part of their length, ſo form a ſort of cone; the branches are garniſhed with oblong oval leaves about three inches long, and one and a half broad, of a lucid green on their upper ſurface, but pale on their under, having a ſtrong midrib: the edges are indented and waved, with ſharp thorns terminating each of the points, ſo that ſome of the thorns are raiſed upward and others are bent downward; theſe being very ſtiff cannot be handled without pain. The leaves are placed alternate on every ſide of the branches, and from the baſe of their foot-ſtalks the flowers come out in cluſters, ſtanding on very ſhort foot-ſtalks; each of theſe ſuſtain five, ſix, or more flowers. In ſome plants I have obſerved the flowers were wholly male, and produced no berries; in others I have obſerved female and hermaphrodite flowers, but upon ſome large old trees growing on Windſor Foreſt, I have obſerved all three upon the ſame trees. The flowers are of a dirty white, and appear in May; they are ſucceeded by roundiſh berries, which turn to a beautiful red about Michaelmas, but continue on the trees, if they are not deſtroyed, till after Chriſtmas before they fall away——Of the common Holly there are ſeveral varieties with variegated leaves, which are propagated by the nurſery gardeners for ſale, but at preſent are little regarded, the old taſte of filling gardens with ſhorn Evergreens being nearly aboliſhed; however, in the diſpoſition of the clumps or other plantations of Evergreen trees and ſhrubs, a few of the

BOOK II. vulgar, but incomparable tree, whether we propagate it for uſe and defence, or for ſight and ornament.

——Mala furta hominum denſis mucronibus arcens
Securum defendit inexpugnabilis hortum,
Exornatque ſimul, toto ſpectabilis anno,
Et numero, & viridi foliorum luce nitentûm.
COULEII Pl. Lib. vi.

A hedge of Holly, thieves that would invade,
Repulſes like a growing paliſade;
Whoſe numerous leaves ſuch orient greens inveſt,
As in deep winter do the ſpring arreſt.

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moſt lively colours may be admitted, which will have a good effect in the winter ſeaſon, if they are properly diſpoſed. As the different variegations of the leaves of Hollies, are by the nurſery gardeners diſtinguiſhed by different titles, I ſhall here mention the moſt beautiful of them by their common names.

Fair Phillis. Chohole. Milkmaid. Chimney-ſweeper. Glory of the Eaſt. Glory of the Weſt. Painted Lady. Fuller's Cream Holly. Broderick's Holly. Cheney's Holly. Partridge's Holly. Wiſe's Holly. Ellis's. Holly. Gray's Holly. Long-ſtaff's. Holly. Bradley's beſt Holly. Blotched Yellow-berried Holly. Maſon's Copper-coloured Holly. Bench's Ninepenny Holly. Pritchet's Holly. Blind's Cream Holly. Sir Thomas Franklin's Holly. Brittain's Holly. Bradley's Long-leaved Holly. Whitmell's Holly. Bradley's Yellow Holly. Bridgman's Holly. Wells's Holly. Glaſs's Holly. Bagſhot's Holly. Brownrig's Holly. Hertford-ſhire White Holly. Common Blotched Holly. Yellow Blotched Hedge-Hog Holly. Silver Hedge-Hog Holly. Langton Holly.

2. ILEX *(Caroliniana)* foliis ovato-lanceolatis ſerratis. Hort. Cliff. 40. *Holly with oval, ſpear-ſhaped, ſawed leaves.* Aquifolium Carolinienſe, foliis dentatis, baccis rubris. Cateſb. Carol. 1. p. 31. *Carolina Holly with indented leaves and red berries,* commonly called *Dahoon Holly.*

This ſpecies of Holly grows naturally in Carolina, from whence the ſeeds were ſent by the late Mr. Mark Cateſby, who found the trees growing on a ſwamp at a diſtance from Charles-town, but it hath ſince been diſcovered in ſome other parts of North-America. This riſes with an upright branching ſtem to the height of eighteen or twenty feet; the bark of the old ſtem is of a brown colour, but that of the branches or younger ſtalks is green and ſmooth, garniſhed with ſpear-ſhaped leaves, which are more than four inches long, and one and a quarter broad in the broadeſt part, of a light green and thick conſiſtence; the upper part of the

Which makes me wonder why it ſhould be reckoned among the unfortunate trees by Macrobius, Sat. lib. ii. cap. xvi. and by others among the lucky; for ſo it ſeems they uſed to ſend branches of it, as well as of Oak (the moſt fortunate, according to the Gentile Theology) with their Strenæ, (New-Year's Gifts) begun, as Symachus tells us, by King Tatius, almoſt as old as Rome herſelf.

But to ſay no more of theſe ſuperſtitious fopperies, which are many, about this tree, we ſtill dreſs up both our churches and houſes, on Chriſtmas and other feſtival days, with this cheerful green and rutilant berries.

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leaves are ſawed on their edges, each ſerrature ending in a ſmall ſharp ſpine; they ſtand alternately on every ſide the branches, upon very ſhort foot-ſtalks. The flowers come out in thick cluſters from the ſide of the ſtalks; they are white, and ſhaped like thoſe of the common Holly, but are ſmaller; the female and hermaphrodite flowers are ſucceeded by ſmall roundiſh berries in its native country, which make a fine appearance in winter, but they have not as yet produced fruit in England. This plant is tender, and requires a warm expoſure.

The Ilex is of the claſs and order *Tetrandria Tetragynia*.

The manner of propagating the Holly is nearly the ſame as the Yew; only as the plants never appear until the ſecond ſpring, inſtead of ſowing the berries immediately, as was directed for the Yew, they may be buried in the ground, then taken up, and ſown the autumn following. If the plants are ſown as ſoon as they are gathered, they will undoubtedly come up the ſpring twelvemonth after; and this would be the moſt eligible, as well as the ſureſt way of obtaining a crop, could we be certain of guarding them from mice during ſo long a ſpace of time; for theſe animals, when once they find out the ſeeds, will ſoon, unleſs they are exterminated, effectually deſtroy a whole ſeminary. If the planter is not averſe to run this hazard, the beſt method will be to ſow the ſeeds ſoon after they are ripe. During the following ſummer the beds muſt be kept clean of weeds; traps muſt be conſtantly ſet for the mice; and, if the ſeaſon ſhould prove dry, it would aſſiſt the growth of the ſeeds to give them now and then a gentle watering. Theſe precautions being obſerved, the plants will come up in the ſpring following.

In this ſeed-beed the plants may remain two years, and then ſhould be tranſplanted in the autumn, into beds at about eight inches diſtance each way, where they may ſtand two years longer, during which time they muſt be conſtantly kept clean from weeds; and if the plants have thriven well, they will be ſtrong enough to tranſplant where they are deſigned to remain; for when they are tranſplanted at that age, there will be leſs danger of their failing, and they will grow to a larger ſize than thoſe which

Book II. Is there under heaven a more glorious and refreſhing object of the kind, than an impregnable hedge of about four hundred feet in length, nine feet high, and five in diameter, which I can ſhew in my now ruined gardens at Say's Court (thanks to the Czar of Moſcovy *) at any time of the year, glittering with its armed and varniſhed leaves? The taller ſtandards at orderly diſtances, bluſhing with their natural coral: It mocks the rudeſt aſſaults of the weather, beaſts, or hedge-breakers,

Et illum nemo impunè laceſſit.

NOTES.

are removed when they are much larger; but if the ground is not ready to receive them at that time, they ſhould be tranſplanted into a nurſery in rows at two feet diſtance, and one foot aſunder in the rows, in which place the plants may remain two years longer; and if they are deſigned to be grafted or budded with any of the variegated kinds, that ſhould be performed after the plants have grown one year in this nurſery; but the plants ſo budded or grafted ſhould continue two years after in the nurſery, that they may make good ſhoots before they are removed; though the plain ones ſhould not ſtand longer than two years in the nurſery, becauſe when they are older they do not tranſplant ſo well. The beſt time for removing of Hollies is in the autumn, eſpecially in dry land; but where the ſoil is cold or moiſt, they may be tranſplanted with great ſafety in the ſpring; if the plants are not too old, or if they have not ſtood long unremoved, there is great odds of their dying when removed.

The Holly is an excellent plant for hedges, and would claim the preference to the Hawthorne, were it not for the ſlowneſs of its growth while young, and the difficulty of tranſplanting the plants when grown to a moderate ſize. This will grow beſt in cold ſtony lands, where, if once it takes well, the hedges may be rendered ſo cloſe and thick as to keep out all ſorts of animals; it will grow to a conſiderable height, and be of long duration. Theſe hedges may be raiſed by ſowing the berries either in the place where they are deſigned to remain, or by planting young plants of three or four years growth; but as the berries continue in the ground an entire year before the plants appear, few perſons care to wait ſo long; therefore the uſual and beſt method is to plant the hedges with plants of the before-mentioned age. But where this is practiſed, they ſhould be tranſplanted either early in the autumn, or deferred till toward the end of March; then the ſurface of the ground ſhould be covered with mulch near their roots after they are planted, to keep the earth moiſt; and if the ſeaſon ſhould prove dry, the plants ſhould be watered at leaſt once a week, until they have taken root, otherwiſe they will be in danger of miſcarrying; for which reaſon the autumnal planting is generally preferred to the ſpring, eſpecially in dry grounds.—— Columella's deſcription of a good hedge is highly applicable to one made of Holly, "Neu ſit pecori, neu pervia furi."

* The Czar Peter the Great reſided at Mr. Evelyn's houſe, in order that he might be near the yard at Deptford during his ſtay in England.

It is with us of two eminent kinds, the prickly and ſmoother leaved, or, as ſome term it, the Free Holly, not unwelcome, when tender, to ſheep and other cattle. There is alſo of the White-berried, and a Golden and Silver, variegated in ſix or ſeven differences, which proceeds from no difference in the ſpecies, but accidentally, and naturæ luſu, as moſt ſuch variegations do: ſince we are taught how to effect it artificially, namely, by ſowing the ſeeds, and planting in gravelly ſoil, mixed with ſtore of chalk, and preſſing it hard down; it being certain, that they return to their native colour when ſown in richer mould, and that all the fibres of the roots recover their natural food.

I have already ſhewed how it is to be raiſed of the berries (of which there is a ſort bears them yellow, and propagate their colour) when they are ready to drop; this only omitted, that they ſhould firſt be freed from their tenacious and glutinous mucilage by being waſhed, and a little bruiſed, then dried with a cloth, or elſe bury them as you do the Yew and Hips: and let the Foreſter receive this for no common ſecret, and take notice of the effect. If you will ſow them in the berry, keep them in dry ſand till March, remove them alſo after three or four years; but if you plant the ſets, (which is likewiſe a commendable way, and the woods will furniſh enough) place them northwards, as they do Quick: Of this might their living pales and encloſures be made, (ſuch as the Right Honourable my Lord Dacres, ſomewhere in Suſſex, has a park almoſt environed with, able to keep in any game, as I am credibly informed) and cut into ſquare hedges it becomes impenetrable, and will thrive in the hotteſt as well as the coldeſt places. I have ſeen hedges, or, if you will, ſtout walls of Holly twenty feet in height, kept upright, and the gilded ſort budded low, and in two or three places one above another, ſhorn and faſhioned into columns and pilaſters, architectonially ſhaped, and at due diſtance; than which nothing can poſſibly be more pleaſant, the berry adorning the intercolumniations with ſcarlet feſtoons and encarpa. Of this noble tree one may take thouſands of them, four inches long, out of the woods, (growing amongſt the fallen leaves) and ſo plant them; but this ſhould be before the cattle begin to crop them, eſpecially ſheep, who are greedy of them when tender: Stick them into the ground in a moiſt ſeaſon, in ſpring, or early autumn, eſpecially the ſpring, ſhaded (if it prove too hot and ſcorching) till they begin to ſhoot of themſelves, and in very ſharp weather, and during our Eaſtern Eteſians, covered with dry ſtraw or

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haume; and if any of them ſeem to periſh, cut it cloſe, and you ſhall ſoon ſee it revive. Of theſe ſeedlings, and by this culture, I have raiſed plants and hedges full four feet high in four years: The luſtier and bigger the ſets are, the better; and if you can procure ſuch as are a thumb's breadth thick, they will ſoon furniſh into an hedge. At Dungeneſs, in Kent, they grow naturally amongſt the very Beech and Pebbles; but if your ground be ſtiff, looſen it with a little fine gravel: This rare hedge, the boaſt of my Villa, was planted upon a burning gravel, expoſed to the meridian ſun; for it refuſes not almoſt any ſort of barren ground, hot or cold, and often indicates where coals are to be dug.

True it is, that time muſt bring this tree to perfection; it does ſo to all things elſe, *& poſteritati pangimus.* But what if a little culture about the roots, (not dunging, which it abhors) and frequent ſtirring of the mould, double its growth? We ſtay ſeven years for a tolerable Quick; it is worth ſtaying thrice ſeven for this, which has no competitor.

And yet there is an expedient to effect it more inſenſibly, by planting it with the Quick: Let every fifth or ſixth be a Holly-ſet, they will grow up infallibly with your Quick; and as they begin to ſpread, make way for them by extirpating the White Thorn, till they quite domineer: Thus was my hedge firſt planted, without the leaſt interruption to the fence, by a moſt pleaſant metamorphoſis. But there is alſo another, not leſs applauded, by laying along well-rooted ſets, a yard or more in length, and ſtripping off the leaves and branches, letting only ſomething of the tops appear: Theſe, covered with a competent depth of earth, will ſend forth innumerable ſuckers, which will ſuddenly advance into an hedge; and grows as well under the ſhade as ſun, provided you keep them weeded, and now and then looſen the earth; towards which, if through extreme neglect, or other accident, it grow thin, being cloſe cut down it will fill and become ſtronger and thicker than ever.

Of this ſtately ſhrub, as ſome reckon it, there is lately found an Holly, whoſe leaves are as thorny and briſtly, not only at the edges, but all over, as an hedge-hog, which it may properly be called; and I think was firſt brought by Mr. London out of France.

The timber of the Holly (beſides that it is the whiteſt of all hard woods, and therefore uſed by the Inlayer, eſpecially under thin plates of ivory, to render it more conſpicuous) is for all ſturdy uſes; the Mill-wright,

Turner, and Engraver prefer it to any other: It makes the beſt handles and ſtocks for tools, flails, the beſt riding-rods, and carters' whips; bowls, chivers, and pins for blocks: Alſo it excels for door-bars and bolts; and as of the Elm, ſo of this eſpecially, they made even hinges and hooks to ſerve inſtead of iron, ſinking in the water like it; and of the bark is compoſed our bird-lime, thus:

Peel a good quantity of the bark about Midſummer; fill a veſſel with it, and put to it ſpring-water; then boil it till the gray and white bark riſe from the green, which will require near twelve hours boiling; then taking it off the fire, ſeparate the barks, the water firſt well poured off. Then lay the green bark on the earth, in ſome cool vault or cellar, covering it with any ſort of green and rank weeds, ſuch as Dock, Thiſtles, Hemlock, &c. to a good thickneſs; thus let it continue near a fortnight, by which time it will become a perfect mucilage; then pound it all exceedingly in a ſtone mortar, till it be a tough paſte, and ſo very fine as no part of the bark be diſcernable: This done, waſh it accurately well in ſome running ſtream of water, as long as you perceive the leaſt ordure or motes in it, and ſo reſerve it in ſome earthen pot, to purge and ferment, ſcumming it as often as any thing ariſes for four or five days, and when no more filth comes, change it into a freſh veſſel of earth, and reſerve it for uſe, thus: Take what quantity you pleaſe of it, and in an earthen pipkin add a third part of capon's or gooſe-greaſe to it, well clarified, or oil of Walnuts, which is better; incorporate theſe on a gentle fire, continually ſtirring it till it be cold, and thus your compoſition is finiſhed. But to prevent froſts, (which, in ſevere weather, will ſometimes invade it on the rods) take a quarter of as much oil of Petroleum as you do of greaſe, and no cold whatever will congeal it. The Italians make their Viſchio of the berries of the miſleto of trees, (and indeed it is from this it is ſaid of the Thruſh, *Exitium ſuum cacat*, that bird being ſo exceeding devourers of them) treated much after the ſame manner; but then they mix it with nut-oil, an ounce to a pound of lime, and taking it from the fire, add half an ounce of turpentine, which qualifies it alſo for the water. Great quantities of bird-lime are brought to us out of Turkey, and from Damaſcus, which ſome conceive to be made of Sebeſtens, finding ſometimes the kernels. This lime is of a greener colour, ſubject to froſts, and impatient of wet, nor will laſt above a year or two good. Another ſort comes alſo out of Syria, of a yellow hue; likewiſe from Spain, whiter than the reſt, which will reſiſt the water, but is of an ill ſcent. I have been told that the Cortex of our Lantana, or Wayfaring Shrub, will make as

Book II. good bird-lime as the beſt. But let theſe ſuffice, being more than as yet any one has publiſhed. The ſuperior leaves of Holly trees, dried to a fine powder and drank in white wine, are prevalent againſt the ſtone, and cure fluxes; and a dozen of the mature berries, being ſwallowed, purge phlegm without danger: To which the learned Mr. Ray (in Append. Plant. Angl.) adds a zythogalum, or poſſet, made of milk and beer, in which is boiled ſome of the moſt pointed leaves, for aſſuaging the torment of the cholic, when nothing elſe has prevailed.

LAUREL*.

Lauro-Ceraſus. The Cherry-Bay. From the uſe we commonly put this ſhrub to, it ſeems as if it had been only deſtined for hedges, and to cover bare walls: Being planted upright, and kept to the ſtandard, by cutting away the collateral branches, and maintaining one ſtem, it will riſe to a very conſiderable tree, reſembling (for the firſt twenty years) the moſt beautiful-headed Orange in ſhape and verdure, and arriving in time to emulate even ſome of our luſty timber-trees; ſo as I dare pronounce it to be one of the moſt proper and ornamental trees for walks and avenues of any growing.

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* This tree was formerly called Lauro-Ceraſus, but Linnæus has now made it a ſpecies of the Prunus. In the Sp. Pl. it is titled PRUNUS *(Lauro-Ceraſus)* floribus racemoſis, foliis ſempervirentibus dorſo biglandoloſis. In Hort. Cliff. 185, it is called Padus foliis ſempervirentibus lanceolato-ovatis. *The common Laurel, or Cherry-Bay.*

It is of the claſs and order *Icoſandria Monogynia.*

The young leaves of the Laurel begin to open about the twelfth of March, and are generally all out by the middle of April. The flowers are white; and tho' ſmall, yet being cluſtered together, they make a tolerable appearance: But the berries afford the greateſt beauty, being large, and when ripe very black.

This tree is a native of the Eaſt, and grows naturally about the Black Sea. It was firſt brought into Europe by Cluſius, in the year 1576; and, being eaſily propagated, is now ſpread over Italy, and the greateſt part of Europe.

The Laurel is propagated either from the ſeeds or cuttings. If the former method is practiſed, the ſeeds muſt be gathered from the trees when they are full ripe: This will be known by their being quite black, which is generally about the beginning of October. Theſe ſeeds ſhould be ſown directly in beds of light earth, half an inch deep, which muſt be afterwards hooped over, to be covered in very ſevere froſts. A hedge of furze buſhes alſo ſhould be made around them, to break the force of the free-

Pity it is they are ſo abuſed in the hedges, where the lower branches growing ſticky and dry, by reaſon of their frequent and unſeaſonable cuttings (the genius of the tree being to ſpend much in wood) they never ſucceed after the firſt ſix or ſeven years; but are to be new-planted again, or abated to the very roots for a freſh ſhoot, which is beſt, and ſoon would furniſh the places. In a word; as to the pruning of Evergreen hedges, there is no ſmall ſkill and addreſs to be uſed, in forming and trimming them for beauty and ſtability; leave the lower parts next the ground broader (two feet were ſufficient for the thickneſs of the talleſt hedge) than the tops, gradually, ſo as not much to exceed a foot breadth

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zing black winds, and ſecure the ſeeds, together with the mats, from being deſtroyed. This is a much ſafer method than covering the beds with litter, which, if neglected to be taken off when the froſt is over, will retain the rains which generally ſucceed ſuch weather, ſodden the beds, and make them ſo wet as frequently to deſtroy the whole of the expected crop. The ſeeds being ſown, and preſerved with the above care, will appear in the ſpring. During the following ſummer they ſhould be kept clear of weeds, as well as watered in dry weather; and all the enſuing winter they muſt remain untouched in their beds, the furze hedge ſtill ſtanding till the froſty weather is paſt; for if theſe young ſeedlings are planted out in the autumn, the major part of them will be in danger, before the winter is expired, of being thrown out of the ground by the froſt; and not only ſo, but of being really killed by it, as they are not very hardy at one year old. In the ſpring, therefore, when the bad weather is over, let them be planted out in the nurſery-ground, in rows two feet aſunder, and the plants a foot and a half diſtant in the rows, where they may ſtand till they are planted out for good.

Trees raiſed from ſeeds generally grow more upright, and ſeldom throw out ſo many lateral branches as thoſe reared from cuttings; nevertheleſs, as the expectation of a crop from ſeeds has ſo often failed, notwithſtanding great care has been uſed, and as the difficulty of procuring the ſeeds, and preſerving them from the birds, has been very great, the moſt certain and expeditious method of raiſing quantities of theſe trees is by cuttings, and is as follows:

In the month of Auguſt the cuttings ſhould be gathered, about a foot and a half in length. They will thrive the better for having a bit of the laſt year's wood at the end, though without this they will grow exceedingly well. The under leaves ſhould be cut off a foot from the thick end of the cutting, which muſt all be planted about a foot deep in the ground; the other half foot, with its leaves, being above it. No diſtance need be obſerved in planting theſe cuttings, which may be ſet as thick as you pleaſe, though the ground for raiſing them ſhould be ſheltered, leſt the winds, which are frequently high at this time of the year, or ſoon after, ſhould looſen the plants juſt when they are going to ſtrike root, if not wholly blow them out.

The weather when the cuttings are to be planted ſhould be either rainy or cloudy; and if no ſhowers ſhould fall in Auguſt, the work muſt be deferred till they do; for

Book II. at the upmoſt verge, (as architects diminiſh walls of ſtone and brick from the foundation) for they will elſe be apt to bend and ſwag, (eſpecially when laden with winter ſnows or ice) grow too thick, heat, wither, and foul within, dry and ſticky eſpecially; when it were more than time they were cut cloſe to the earth, for a freſh and verdant ſpring; and this method is to be practiſed in all hedges whatſoever.

But would you yet improve the ſtandard, which I celebrate, to greater and more ſpeedy exaltation, bud your Laurel on the Black Cherry ſtock to what height you pleaſe: This I had from an ocular teſtimony, who was

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if cuttings are planted in Auguſt when the weather is parching and dry, they will be burnt up, without great care and trouble in ſhading and watering. Neither is cloudy or rainy weather only to be recommended in planting theſe cuttings, but a ſhady ſituation alſo, either under a north wall, or in beds which are covered the greateſt part of the day with the umbrage of large trees. This ſhady ſituation is very neceſſary for them; ſince, though the weather be rainy and cloudy when they are planted out, yet ſhould it prove fair afterwards, the ſun will ſoon dry up the moiſture at that ſeaſon, and endanger the plants, if they are not conſtantly watered and protected with a ſhade; which at once ſhews the expediency of pitching on a ſpot where ſuch a conveniency is natural.

If theſe cuttings are planted in Auguſt, they will take root before winter, eſpecially if they have ſhade, and water in dry weather; but they ſhould remain undiſturbed till the ſpring twelvemonth following, in order to acquire ſtrength to be planted in the nurſery. During the ſummer, they will require no other trouble than watering in dry weather, and keeping clean from weeds; and by the autumn they will have made a ſhoot of perhaps a foot or more in length. In the beds, nevertheleſs, they ſhould remain till the ſpring, when they ſhould all be carefully taken out, and planted in the nurſery, as was directed for the ſeedlings.

When theſe trees are intended to form a large plantation, any time during the winter will be proper for the work, though I would recommend the month of October as the moſt favourable ſeaſon. The ground ought to be prepared for their reception by plowing; and they ſhould be planted in holes made all over it, at one yard aſunder. When they begin to touch each other, do not immediately thin them, but ſuffer them to remain unthinned two or three years longer, by which means they will draw one another up to regular ſtems. When you begin to thin them, it muſt be done ſparingly, and in ſmall quantities, only taking out a weakly plant here and there, to make room for the more vigorous ſhooting of the others, leſt the cold, entering the plantation too much at once, ſhould retard its growth, if not wholly deſtroy it.

The danger of loſing theſe plants is, I believe, only when they have been uſed to grow cloſe, and the cold is ſuffered to ruſh in upon them all of a ſudden; but where they have been planted on bleak or expoſed places ſingly, I ſeldom ever knew a plant

more than ſomewhat doubtful of ſuch alliances; though ſomething like it in Palladius, ſpeaks it not ſo impoſſible: CHAP. VI.

Inſeritur Lauro Ceraſus, partuque coacto
Tingit adoptivus virginis ora pudor.

A Cherry graft on Laurel ſtock, does ſtain
The virgin fruit in a deep double grain.

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of this tree killed by the cold. However, let theſe plantations be continued to be thinned with caution till the general fall.

The Laurel is now ſo far naturalized to us, as to grow well in almoſt any of our ſoils or ſituations: ſo that plantations of this tree may be made in any place where there is a conveniency. In Italy there are numerous woods conſiſting entirely of theſe trees; and although England at preſent cannot boaſt of many plantations of this kind, yet his Grace the Duke of Bedford has ſet a noble example to men of fortune, at Wooburn, where he has planted one hill ſolely with Laurels, which thrive exceedingly; as do thoſe alſo which are mixed in great quantities with the other Evergreens, throughout his whole plantations.

Beſides the common Laurel there is another kind entitled by Tournefort, Inſt. 628, Lauro-Ceraſus Luſitanica minor. *The Smaller Portugal Laurel*; called, in its native country, *Azoureiro*.

The leaves of this ſhrub are ſhorter than thoſe of the common Laurel, approaching nearer to an oval form; they are of the ſame conſiſtence, and of a lucid green, which, mixing with the red branches, make a beautiful appearance. The flowers are produced in long looſe ſpikes from the ſide of the branches; they are white, and ſhaped like thoſe of the common Laurel, appearing in June, and are ſucceeded by oval berries ſmaller than thoſe of the common Laurel; they are firſt green, afterward red, and when ripe are black, incloſing a ſtone like the Cherry.

This kind may be propagated in the ſame way as the common Laurel, either by cuttings, layers, or ſeeds. If the cuttings are planted at the ſame ſeaſon, and in the ſame way as hath been directed for the common Laurel, they will take root very freely; or if the young branches are laid in the autumn, they will take root in one year, and may then be removed into a nurſery, where they may grow a year or two to get ſtrength, and then be tranſplanted where they are to remain.

This tree is much hardier than the common Laurel; for in the ſevere froſt of the year 1740, when great numbers of Laurels were entirely killed, and moſt of them loſt their verdure, this remained unhurt in perfect verdure, which renders it more valuable; and as by the appearance of ſome trees now growing in the gardens, they ſeem as if they would grow to a large ſize, ſo it is likely to be one of the moſt ornamental Evergreens we have.

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They are raiſed of the ſeeds or berries with extraordinary facility, or propagated by layers, taleæ, and cuttings, ſet about the latter end of Auguſt, or earlier at St. James's tide, wherever there is ſhade and moiſture. Beſides that of the wood, the leaves of this Laurel, boiled in milk, impart a very grateful taſte of the Almond; and of the berries, or cherries rather, (which poultry generally feed on) is made a wine, to ſome not unpleaſant. I find little concerning the uſes of this tree; of the wood are ſaid to be made the beſt plow-handles. Note, that this rare tree was firſt brought from Civita-Vecchia into England by the Counteſs of Arundel, wife to that illuſtrious patron of arts and antiquities, Thomas Earl of Arundel and Surry, great great grandfather to his Grace the preſent Duke of Norfolk, whom I left ſick at Padua, where he died, highly diſpleaſed at his grandſon Philip's putting on the Friar's frock, tho' afterwards the Purple, when Cardinal of Norfolk. After all, I cannot eaſily aſſent to the tradition, though I had it from a noble hand: I rather think it might firſt be brought out of ſome more northerly clime, the nature of the tree ſo delighting and flouriſhing in the ſhady and colder expoſures, with an abhorrence of heat.

BAY TREE *.

Laurus Vulgaris. The Bay Tree. The learned Iſaac Voſſius, and Etymologiſts, are wonderfully curious in their conjectures concerning its derivation; *a Laude*, ſays Iſidore. And from the ingenious Poet, we learn how it became ſacred to Apollo, the Patron of the Wits, and ever ſince the Meed of Conquerors and heroic Perſons. But leaving fiction, we paſs to

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* Of the Laurus there are no leſs than eleven Species enumerated by Linnæus, but it will be unneceſſary in this place to take notice of more than one, viz.

Laurus *(Nobilis)* foliis venoſis lanceolatis perennantibus, floribus quadrifidis dioicis. Lin. Sp. Pl. 529. Laurus Vulgaris. B. P. 460. *The Bay Tree.*

It is of the claſs and order *Enneandria Monogynia.*

This ſhrub is propagated by ſeeds, cuttings, layers, and ſuckers, in a manner well known to every gardener. As this beautiful plant will grow under the dripping of trees, it is qualified for adorning the borders of woods and pleaſure grounds. The leaves begin to open about the middle of March, and are quite out by the beginning of May. The flowers are of a light yellow colour, but make no ſhow. It is a native of Italy. It is beyond a doubt that the *Bay Tree*, and not the *Laurel*, is the *Laurus* of the antients. The Laurel was not known in Europe till the latter end of

the culture of this noble and fragrant tree, propagated both by ſeeds, cuttings, ſuckers, and layers. They (namely the berries) ſhould be gathered dropping ripe: Pliny has a particular proceſs for the ordering of them, not to be rejected, which is to gather them in January, and ſpreading them till their ſweat be over, he then puts them in dung, and ſows them: As for the ſteeping in wine, water does altogether as well: Others waſh the ſeeds from their mucilage, by breaking and bruiſing the glutinous berries, then ſow them in rich ground in March, by ſcores in a heap; and indeed ſo they will come up in cluſters, but nothing ſo well, nor fit for tranſplantation, as where they are interred with a competent ſcattering, ſo as you would furrow peaſe. Both this way, and by ſetting them apart, which I moſt commend, I have raiſed multitudes, and that in the berries, kept in ſand till the ſpring, without any farther preparation; only for the firſt two years they ſhould be defended from the piercing winds, which frequently deſtroy them; and yet the ſcorching of their tender leaves ought not to make you deſpair, for many of them will recover beyond expectation; nay, though quite cut down, they repullulate and produce young ſuckers. Such as are raiſed of berries may at three years growth be tranſplanted; which let alone too long, are difficult to take.

This aromatic tree greatly loves the mother's ſhade, (under which nothing elſe will proſper) yet thrives beſt in our hotteſt gravel, having once

NOTES.

the ſixteenth century, about which time it was brought from Trebizond to Conſtantinople, and from thence it ſpread over moſt parts of Europe. Beſides, *our* Laurel has not the properties aſcribed by the antients to *their* Laurus. Virgil ſays it has a fine ſmell, which the Laurel has not:

Et vos, O Lauri, carpam, et te proxime, Myrte,
Sic poſitæ, quoniam *ſuaves* miſcetis *odores*. ECL. ii.

And in the ſixth Æneid, "Oderatum Lauri nemus."

The Pythian Prieſteſs chewed the leaves of this tree before ſhe was placed upon the ſacred Tripod. Theſe being uſed after an abſtinence of three days, naturally produced that wild enthuſiaſm with which her Oracles were always attended From its being thus uſed it obtained the name of the "Prophetic Tree." Whence Claudian,

——— venturi præſcia Laurus.

Amongſt the antients, Crowns of Laurel were worn by ſucceſsful Generals when they made their triumphal entries: Apollo, when he made this tree his own, ſays,

Tu ducibus Latiis aderis, cum læta triumphum
Vox canet; et longæ viſent Capitolia pompæ. OVID.

Book II. paſſed thoſe firſt difficulties: Age, and culture about the roots, wonderfully augment its growth; ſo as I have ſeen trees near thirty feet high of them, and almoſt two feet diameter. They make walking-ſtaves, ſtraight, ſtrong, and light for old Gentlemen; and are fit alſo both for arbour and paliſade work, ſo the gardener underſtand when to prune and keep them from growing too woody. And here I cannot but take notice of thoſe beautiful caſe-ſtandards, which of late you have had out of Flanders, &c. with ſtems ſo even and upright, heads ſo round, full, and flouriſhing, as ſeem to exceed all the topiary ornaments of the garden, that one tree of them has been ſold for more than twenty pounds; tho' now, the myſtery revealed, the price be much abated; and, doubtleſs, as good might be raiſed here, (without ſending beyond ſea for them) were our gardeners as induſtrious to cultivate and ſhape them. Some there are, who imagine them of another ſpecies than our ordinary Bay, but erroneouſly. I wonder we plant not whole groves of them and abroad; they being hardy enough, grow upright, and would make a noble Daphneon. The berries are emollient, ſovereign in affections of the nerves, cholics, &c. they make good gargariſms, baths, ſalves, and perfumes: Of Bay-leaves dried in a fire-pan and reduced to a fine powder, as much as will cover half a crown, being drank in wine, ſeldom fails of curing an ague. And ſome have uſed the leaves inſtead of cloves, imparting its reliſh in ſauce, eſpecially of fiſh: and the very dry ſticks of the tree, ſtrewed over with a little powder or duſt of ſulphur, and vehemently rubbed againſt one another, will immediately take fire, as will likewiſe the wood of an old Ivy; nay, without any intentive addition, by friction only.

Amongſt other things, it has of old been obſerved that the Bay is ominous of ſome funeſt accident, if that be ſo accounted which Suetonius (in Galba) affirms to have happened before the death of the monſter Nero, when theſe trees generally withered to the very roots in a very mild winter: and much later; that in the year 1629, when at Padua, preceding a great peſtilence, almoſt all the Bay trees about that famous Univerſity grew ſick and periſhed: *Certo quaſi præſagio*, ſays my Author, *Apollinem Muſaſque, ſubſequenti anno urbe illa bonarum literarum domicilio exceſſuras.*——But that this was extraordinary, we are told the Emperor Claudius, upon occaſion of a raging peſtilence, was, by his Phyſicians, adviſed to remove his court to Laurentium, the aromatick emiſſions of that tree being in ſuch reputation for clearing the air, and reſiſting contagion; upon which account I queſtion not but Pliny, the Nephew, was ſo frequently at his beloved

Laurentium, ſo near the city. Beſides, thoſe trees were extolled for their virtue againſt lightning, which Tiberius ſo exceedingly dreaded, that when it came with thunder, he would creep under his bed to avoid it, ſhading his head with the boughs. The ſtory of the branch in the bill of the white hen, let fall into the lap of Livia Druſilla, being planted, proſpered ſo floridly, as made it reputed ſo ſacred as to uſe it for impaling the heads of the triumphing Emperors, and to adorn the Limina of the Temples and Royal Palace of the great Pontiff; and thence called *Janitrices Cæſarum*.

Cur tamen appoſita velatur janua lauro;
Cingit & Auguſtas arbor opaca fores?
Num quia perpetuos meruit domus iſta triumphos? OVID.

As ſtill at preſent in Rome, and other cities, they uſe to trim up their churches and monaſteries on ſolemn feſtivals, when there is ſtation and indulgences granted in honour of the ſaint or patron; as alſo on occaſion of ſignal victories, and other joyful tidings; and thoſe garlands, made up with hobby-horſe tinſel, make a glittering ſhow, and rattling noiſe when the air moves them.

With the leaves of Laurel were made up the diſpatches and letters, which were ſent to the Senate from the victorious General: The ſpears, lances, and faſces, nay tents and ſhips, &c. were all dreſſed up with Laurels; and in triumph every common ſoldier carried a ſprig in his hand, as we may ſee in the beſt baſs-relievo of the antients, as of virtue to purge them from blood and ſlaughter. And now, after all this, might one conjecture by a mere inſpection of thoſe ſeveral ſculps, ſtatues, and medals yet extant, repreſenting the heads of Emperors, Poets, &c. the wreaths and coronets to be compoſed of a more flexible and compliant ſpecies than the common Bay, and more applicable to the brows, except where the ends and ſtalks of the tender branch were tied together with a lemniſc or ribbon. And there be yet who contend for the Alexandrian Laurel, and the Tinus as more ductile, but without any good evidence. Pliny, I find, ſays nothing of this queſtion, naming only the Cyprian and Delphic; beſides, the figure, colour of the rind and leaf, crackling in the fire, which it impugns, (as it is ſaid it does lightning) gives plainly the honour of it to the common Bay. We ſay nothing of its ſacred uſe in the Gentile luſtration, purgation, and ſeveral other attributes.

CHAP. VII.

Of FENCES, QUICK-SETS, *&c.*

Book II. OUR main plantation is now finiſhed, and our foreſt adorned with a juſt variety: But what is yet all this labour, but loſs of time and irreparable expence, unleſs our young and (as yet) tender plants be ſufficiently guarded with munitions from all external injuries? For, as old Tuſſer,

> If cattle or coney may enter to crop,
> Young Oak is in danger of loſing his top.

But with ſomething a more poliſhed ſtile, though to the ſame purpoſe, the beſt of Poets,

> Texendæ ſepes etiam, & pecus omne tenendum eſt:
> Præcipuè, dum frons tenera, imprudenſque laborum:
> Cui, ſuper indignas hyemes, ſolemque potentem,
> Silveſtres uri aſſiduè, capreæque ſequaces
> Illudunt: Paſcuntur Oves, avidæque juvencæ.
> Frigora nec tantum cana concreta pruina,
> Aut gravis incumbens ſcopulis arentibus æſtas;
> Quantum illi nocuere greges, durique venenum
> Dentis, & admorſo ſignata in ſtirpe cicatrix. GEORG. ii.

> Guard, too, from cattle thy new-planted ground,
> And infant-vines that ill can bear a wound:
> For not alone by winter's chilling froſt,
> Or ſummer's ſcorching beam the young are loſt;
> But the wild buffaloes and greedy cows,
> And goats and ſportive kids the branches browze;
> Not piercing colds, nor Sirius' beams that beat
> On the parcht hills, and ſplit their tops with heat,
> So deeply injure, as the nibbling flocks,
> That wound with venom'd teeth the tender, fearful ſtocks.

The reaſon that ſo many complain of the improſperous condition of their wood-lands and plantations of this kind, proceeds from this ne-



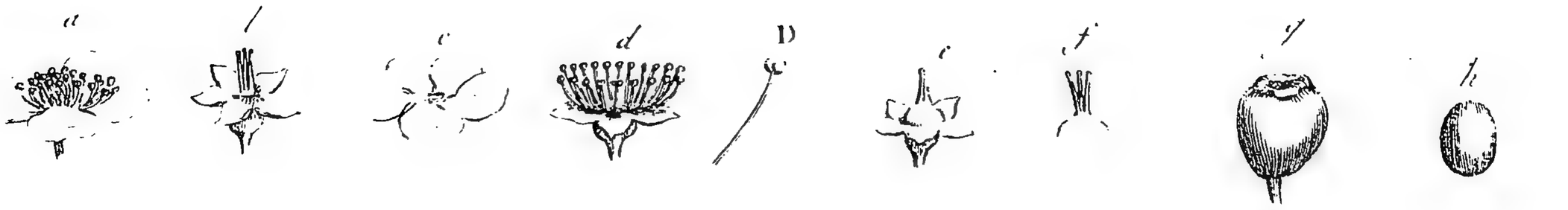


Fig. 1. Aubépine.

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Lith. de Delâtre, rue St-Jacques.

gleƈt; though, ſheep excepted, there is no employment whatſoever incident to the Farmer, which requires leſs expence to gratify their expectations; one diligent and ſkilful man will govern five hundred acres: But if through any accident a beaſt ſhall break into his maſter's field, or the wicked hunter makes a gap for his dogs and horſes, what a clamour is there made for the diſturbance of a year's crop at moſt in a little corn! whilſt abandoning his young woods all this time, and perhaps many years, to the venomous bitings and treading of cattle, and other like injuries, for want of due care, the detriment is many times irreparable; young trees once cropped hardly ever recovering. It is the bane of all our moſt hopeful timber.

But ſhall I provoke you by an inſtance? A kinſman of mine has a wood of more than ſixty years ſtanding; it was, before he purchaſed it, expoſed and abandoned to the cattle for divers years: ſome of the outward ſkirts were nothing, ſave ſhrubs and miſerable ſtarvelings; yet ſtill the place was diſpoſed to grow woody; but by this negleƈt continually ſuppreſſed. The induſtrious Gentleman fenced in ſome acres of this, and cut all cloſe to the ground; and it is come in eight or nine years to be better worth than the wood of ſixty; and will, in time, prove moſt incomparable timber; whilſt the other part, ſo many years advanced, ſhall never recover; and all this from no other cauſe than preſerving it fenced. Judge then by this, how our woods come to be ſo decried: Are five hundred ſheep worthy the care of a ſhepherd? And are not five thouſand Oaks worth the fencing, and the inſpeƈtion of a hayward?

> Et dubitant homines ſerere, atque impendere curam? GEO. ii.
>
> And ſhall men doubt to plant, and careful be?

Let us therefore ſhut up what we have thus laborioufly planted with ſome good Quick-ſet hedge.

HAWTHORN.

The Hawthorn, *(Oxyacantha vulgaris)* and indeed the very beſt of common hedges, is either raiſed of ſeeds or plants; but then it muſt not be with deſpair, becauſe ſometimes you do not ſee them peep the firſt year; for the Haw, and many other ſeeds, being inveſted with a very hard integument, will now and then ſuffer impriſonment two whole years under the earth; and our impatience at this does often fruſtrate the reſurreƈtion

BOOK II.

of divers ſeeds of this nature, ſo that we frequently dig up, and diſturb the beds where they have been ſown, in deſpair, before they have gone their full time, which is alſo the reaſon of a very popular miſtake in other ſeeds, eſpecially that of the Holly, concerning which there goes a tradition, that they will not ſprout till they be paſſed thro' the maw of a Thruſh; whence the ſaying, *Turdus exitium ſuum cacat* (alluding to the Viſcus made thereof, not the Miſleto of Oak); but this is an error, as I am able to teſtify on experience. They come up very well of the berries, treated as I have ſhewed in book ii. chap. vi. and with patience; for, as I affirmed, they will ſleep ſometimes two entire years in their graves; as will alſo the ſeeds of Yew, Sloes, Phillyrea Anguſtifolia, and ſundry others, whoſe ſhells are very hard about the ſmall kernels; but which is wonderfully facilitated by being, as we directed, prepared in beds, and magazines of earth, or ſand, for a competent time, and then committed to the ground before the full in March, by which ſeaſon they will be chitting, and ſpeedily take root. Others bury them deep in the ground all winter, and ſow them in February: And thus I have been told of a Gentleman who has conſiderably improved his revenue, by ſowing Haws only, and raiſing nurſeries of Quick-ſets, which he ſells by the hundred far and near: This is a commendable induſtry; any neglected corners of ground will fit this plantation: Or were ſuch places plowed in furrow about the ground you would fence, and ſowed with the mark of the cyder-preſs, crab-kernels, &c. kept ſecure from cattle till able to defend itſelf, it would yield excellent ſtocks to graff and tranſplant. And thus any larger plot, by plowing and croſs-plowing the ground, and ſowing it with all ſorts of foreſt-ſeeds, breaking and harrowing the clods, and cleanſing it from weeds with the hoe, till the plants over-top them, a very profitable grove may be raiſed, which will prove a magazine of ſingular advantage to furniſh the induſtrious planter.

But Columella has another expedient for the raiſing of our Spinetum, by rubbing the now mature Hips and Haws, Aſhen-keys, &c. into the crevices of baſs ropes, or wiſps of ſtraw, and then burying them in a trench; whether way you attempt it, they muſt (ſo ſoon as they peep, and as long as they require it) be ſedulouſly cleanſed of the weeds; which, if in beds for tranſplantation, had need be, at the leaſt, three or four years; by which time even your ſeedlings will be of ſtature fit to remove: For I do by no means approve of the vulgar præmature planting of ſets, as is generally uſed throughout England; which is to take ſuch only as are the very

ſmalleſt, and ſo to crowd them into three or four files, which are both egregious miſtakes. CH. VII.

Whereas it is found by conſtant experience, that plants as big as one's thumb, ſet in the poſture, and at the diſtance which we ſpake of in the Hornbeam, that is, almoſt perpendicular (not altogether, becauſe the rain ſhould not get in betwixt the rind and wood) and ſingle, or at moſt not exceeding a double row, do proſper infinitely, and much out-ſtrip the denſeſt and cloſeſt ranges of our trifling ſets, which make but weak ſhoots, and whoſe roots do but hinder each other, and for being couched in that poſture, on the ſides of banks and fences, (eſpecially where the earth is not very tenacious) are bared of the mould which ſhould entertain them, by that time the rains and ſtorms of one winter have paſſed over them. In Holland and Flanders (where they have the goodlieſt hedges of this kind about the counterſcarps of their invincible fortifications, to the great ſecurity of their muſketeers upon occaſion) they plant them according to my deſcription, and raiſe fences ſo ſpeedily, and ſo impenetrable, that our beſt are not to enter into the compariſon. Yet, that I may not be wanting to direct ſuch as either affect the other way, or whoſe grounds may require ſome bank of earth, as ordinarily the verges of copſes, and other incloſures do, you ſhall by line caſt up your foſs of about three feet broad, and about the ſame depth, provided your mould hold it; beginning firſt to turn the turf, upon which be careful to lay ſome of the beſt earth to bed your Quick in, and there lay or ſet the plants, two in a foot ſpace is ſufficient; being diligent to procure ſuch as are freſh gathered, ſtraight, ſmooth, and well-rooted; adding now and then, at equal ſpaces of twenty or thirty feet, a young Oakling or Elm-ſucker, Aſh, or the like, which will come in time, eſpecially in plain countries, to be ornamental ſtandards, and good timber: If you will needs multiply your rows, a foot, or ſomewhat leſs, above that, upon more congeſted mould, plant another rank of ſets, ſo as to point juſt in the middle of the vacuities of the firſt, which I conceive enough: This is but for the ſingle foſs; but if you would fortify it to the purpoſe, do as much on the other ſide, of the ſame depth, height, and planting; and then, laſt of all, cap the top in pyramis with the worſt, or bottom of the ditch. Some, if the mould be good, plant a row or two on the edge, or very creſt of the mound, which ought to be a little flattened. Here alſo may they ſet their dry hedges; for hedges muſt be hedged till they are able to defend and ſhade their under

BOOK II. plantation, and I cannot reprove it: But great care is to be had in this work, that the main bank be well footed, and not made with too ſudden a declivity, which is ſubject to fall in after froſts and wet weather, and this is good huſbandry for moiſt grounds; but where the land lies high, and is hot and gravelly, I prefer the lower fencing; which, though even with the area itſelf, may be protected with ſtakes and a dry hedge, on the foſs-ſide, the diſtance competent, and to very good purpoſes of educating more frequent timber amongſt the rows.

Your hedge being yet young, ſhould be conſtantly weeded two or three years, eſpecially before Midſummer, of Brambles, the great Dock, Thiſtle, &c. though ſome admit not of this work till after Michaelmas, for reaſons that I approve not. It has been the practice of Herefordſhire, in the plantation of Quick-ſet hedges, to plant a Crab-ſtock at every twenty feet diſtance; and this they obſerve ſo religiouſly, as if they had been under ſome rigorous ſtatute requiring it: And by this means they were provided in a ſhort time with all advantages for the graffing of fruit amongſt them, which does highly recompenſe their induſtry. Some cut their ſets at three years growth even to the very ground, and find that in a year or two they will have ſhot as much as in ſeven, had they been let alone.

When your hedge is now of near ſix years ſtature, plaſh it about February or October; but this is the work of a very dextrous and ſkilful huſbandman; and for which our honeſt countryman, Mr. Markham, gives excellent directions; only I ápprove not ſo well of his deep cutting the ſtems, if it be poſſible to bend them, having ſuffered in ſomething of that kind. It is almoſt incredible to what perfection ſome have laid theſe hedges, by the rural way of plaſhing, better than by clipping; yet may both be uſed for ornament, as where they are planted about our garden-fences, and fields near the manſion. In Scotland, by tying the young ſhoots with bands of hay, they make the ſtems grow ſo very cloſe together, as that it encloſeth rabbits in warrens inſtead of pales: and for this robuſt uſe we ſhall prefer the Black Thorn; the extravagant ſuckers which are apt to riſe at diſtance from the hedge-line, being ſeduloufly extirpated, that the reſt may grow the ſtronger and thicker.

And now ſince I did mention it, and that moſt I find do greatly affect the vulgar way of Quicking, (that this our diſcourſe be in nothing defi-

cient) we will in brief give it you again after George Markham's deſcription, becauſe it is the beſt and moſt accurate, although much reſembling our former direction, of which it ſeems but a repetition, till he comes to the plaſhing. In ground which is more dry than wet, (for watery places it abhors) plant your Quick thus: Let the firſt row of ſets be placed in a trench of about half a foot deep, even with the top of your ditch, in ſomewhat a ſloping or inclining poſture; then having raiſed your bank near a foot upon them, plant another row, ſo as their tops may juſt peep out over the middle of the ſpaces of your firſt row: Theſe covered again to the height or thickneſs of the other, place a third rank oppoſite to the firſt, and then finiſh your bank to its intended height. The diſtances of the plants ſhould not be above one foot; and the ſeaſon to do the work in may be from the entry of February till the end of March, or elſe in September to the beginning of December. When this is finiſhed, you muſt guard both the top of your bank, and outmoſt verge of your ditch, with a ſufficient dry hedge, interwoven from ſtake to ſtake into the earth, which commonly they do on the bank, to ſecure your Quick from the ſpoil of cattle. And then being careful to repair ſuch as decay, or do not ſpring, by ſupplying the dead and trimming the reſt, you ſhall, after three years growth, ſprinkle ſome timber-trees amongſt them, ſuch as Oak, Beech, Aſh, Maple, Fruit, or the like; which being drawn young out of your nurſeries, may be very eaſily inſerted.

I am not in the mean time ignorant of what is ſaid againſt the ſcattering theſe maſts and keys among our fences; which grown, over-top the ſubnaſcent hedge, and prejudice it with their ſhade and drip: But this might be prevented by planting Hollies, proof againſt theſe impediments, in the line or trench where you would raiſe ſtandards, as far as they uſually ſpread in many years, and which, if placed at good diſtances, how cloſe ſoever to the ſtem, would, beſides their ſtout defence, prove a wondrous decoration to large and ample incloſures. But to reſume our former work: That which we affirmed to require the greateſt dexterity, is the artificial plaſhing of our hedge, when it is now arrived to a ſix or ſeven years head; though ſome ſtay till the tenth, or longer. In February therefore, or October, with a very ſharp hand-bill, cut away all ſuperfluous ſprays and ſtragglers, which may hinder your progreſs, and are uſeleſs. Then ſearching out the principal ſtems, with a keen and light hatchet cut them ſlantwiſe cloſe to the ground, hardly three quarters through, or rather ſo far

Book II. only as till you can make them comply handſomely, which is your beſt direction, leſt you rift the ſtem, and ſo lay it from your ſloping as you go, folding in the leſſer branches which ſpring from them; and ever within five or ſix feet diſtance, where you find an upright ſet (cutting off only the top to the height of your intended hedge) let it ſtand as a ſtake, to fortify your work, and to receive the twinings of thoſe branches about it. Laſtly, at the top (which ſhould be about five feet above ground) take the longeſt, moſt ſlender, and flexible twigs which you reſerved, and (being cut as the former, where need requires) bind in the extremities of all the reſt; and thus your work is finiſhed. This being done very cloſe and thick, makes an impregnable hedge in few years; for it may be repeated as you ſee occaſion; and what you ſo cut away will help to make your dry hedges for your young plantations, or be profitable for the oven, and make good bavin; namely, the extravant ſide-branches ſpringing the more upright, till the newly wounded are healed. There are ſome yet who would have no ſtakes cut from the trees, ſave here and there one, ſo as to leave half the head naked, and the other ſtanding; but the over-hanging bows will kill what is under them, and ruin the tree; ſo pernicious is this half-topping: Let this be a total amputation for a new and luſty ſpring. There is nothing more prejudicial to ſubnaſcent young trees, than, when newly trimmed and pruned, to have their (as yet raw) wounds poiſoned with continual dripping, as is well obſerved by Mr. Nourſe; but this is meant of repairing decayed hedges: For ſtakes in this work, Oak is to be preferred, though ſome will uſe Elder, but it is not good, or the Black Thorn and Crab tree; in mooriſh ground Withy, Aſh, Maple, and Haſel (which laſt ſome make hedges of, but it being apt to the browſing of cattle when the young ſhoots appear, it does better in copſes, the reſt not laſting) ſhould yet be driven well in at every yard of interval both before and after they are bound, till they have taken the hard earth, and are very faſt; and even your plaſhed hedges need ſome ſmall Thorns to be laid over, to protect the ſpring from cattle and ſheep, till they are ſomewhat fortified, and the doubler the winding is lodged the better, which ſhould be beaten, and forced down together with the ſtakes, as equally as may be. Note, that in ſloping your windings, if it be too low done, as very uſually, it frequently mortifies the tops; therefore it ought to be ſo bent as it may not impede the mounting of the ſap. If the plaſh be of a great and extraordinary age, wind it at the nether boughs all together, and cutting the ſets, as directed, permit it rather to hang downwards a little than riſe too forwards; and then twiſt the branches into the work, leaving a

ſet free, and unconſtrained at every yard ſpace, beſides ſuch as will ſerve for ſtakes, abated to about five feet length, (which is a competent ſtature for an hedge) and ſo let it ſtand. One ſhall often find in this work, eſpecially in old neglected hedges, ſome great trees or ſtubs that commonly make gaps for cattle; ſuch ſhould be cut ſo near the earth as till you can lay them thwart, that the top of one may reſt on the root or ſtub of the other, as far as they extend, ſtopping the cavities with its boughs and branches; and thus hedges, which ſeem to conſiſt but only of ſcrubby trees and ſtumps, may be reduced to a tolerable fence: but in caſe it be ſuperannuated, and very old, it is adviſable to ſtub all up, being quite renewed and well guarded. We have been the longer on theſe deſcriptions, becauſe it is of main importance, and that ſo few huſbandmen are ſo perfectly ſkilled in it: But he that would be more fully ſatisfied, I would have him conſult Mr. Cook, chap. xxxii. or rather, *Inſtar omnium*, what I cannot without injury to the publick and ingratitude to the perſons who do me the honour of imparting to me their experiences, but as freely communicate.

It is then from the Reverend Mr. Walker, of Great Billing near Northampton, that (with ſeveral other particulars relating to our rural ſubject) I receive from that worthy Gentleman Thomas Franklin, of Ecton, Eſq; the following method of planting and fencing with Quick-ſets, which we give you in his own words:

" About ten or twelve years ſince I made ſome eſſays to ſet ſome little " clumps of hedges and trees of about two poles in breadth, and three in " length; the out-fences ditched on the outſide, but the Quick-ſets in the " inſide of the bank, that the dead hedges might ſtand on the outſide " thereof; ſo that a ſmall hedge of eighteen or twenty inches high, made " of ſmall wood, the ſtakes not much bigger than a man's thumb, the " banks being high, ſufficiently defended them for four years time, and " were hedged with leſs than one load of ſhreadings of Willow-ſets, which, " as my workmen told me, would have required ſix load of copſe-wood: " But the next year after their being planted, finding waſte ground on the " top of the bank of the outer fence, between the dead hedge and the " quick, I put a foot-ſet in the ſame ſpace between the quick and the dead " hedge, which proſpered better than thoſe planted in the ſide of the bank, " after the vulgar way, and hold it ſtill. This put me upon thinking, " that a Set cheaper and better of Quick-fence might poſſibly be found " out; and accordingly I made ſome trials with good ſucceſs, (at leaſt " better than the old way) though not to my full ſatisfaction, till I had

Book II. " peruſed Mr. Evelyn's Silva, &c. The method I uſed was this: Firſt, I
" ſet out the ground for ditches and quick, in breadth ten feet; then ſub-
" divided that, by marking out two feet and a half on each ſide (more or
" leſs, at pleaſure) for the ditches, leaving five in the middle between
" them: Then digging up two feet in the midſt of that five feet, plant
" the ſets in; though it require more labour and charge, I found it ſoon
" repaid the coſt. This done, I began to dig the foſſes, and to ſet up one
" row of turfs on the outſide of the ſaid five feet; namely, one row on
" each ſide thereof, the green ſide outmoſt, a little reclining, ſo as the
" graſs might grow: After this, returning to the place begun at, I ordered
" one of the men to dig a ſpit of the under turf-mould, and lay it be-
" tween the turfs, placed edge-wiſe, as before deſcribed, upon the two feet
" which was purpoſely dug in the middle, and prepared for the ſets, which
" the planter ſets with two Quicks upon the ſurface of the earth, almoſt
" upright, whilſt another workman lays the mould forward about twelve
" inches, and then ſets two more, and ſo continues. Some there are who
" plant three rows of ſets about eight inches interval; but I do not approve
" it, for they choak one another. This finiſhed, I order another row of
" turfs to be placed on each ſide upon the top of the former, and fill the
" vacuity between the ſets and the turfs, as high as their tops, always lea-
" ving the middle, where the ſets are planted, hollow, and ſomewhat lower
" than the ſides of the banks by eight or ten inches, that the rain may
" deſcend to their roots, which is of great advantage to their growth, and
" far better than by the old way; where the banks run too much ſloping,
" the roots of the ſets are ſeldom wetted in an ordinary ſeaſon, the ſummer
" following; but which if it prove dry, many of the ſets periſh, eſpeci-
" ally the late planted: Whereas thoſe which I planted in the latter end of
" April, though the ſummer happened to be ſomewhat dry, generally
" eſcaped, very few of them miſcarrying. Now the planting thus advan-
" ced, the next care is fencing, which is performed by ſetting an hedge of
" about twenty inches high upon the top of the bank, on each ſide thereof,
" leaning a little outward from the ſets, which will protect them as well,
" if not better, than an hedge of three feet, or four inches more, ſtanding
" upon the ſurface of the ground, which being raiſed with the turfs and
" ſods about twenty inches, and the hedge about twenty inches more, will
" make three feet four inches, ſo as no cattle can approach the dead hedge
" to prejudice it, unleſs they ſet their feet in the ditch itſelf; which will
" be at leaſt a foot deep, and from the bottom of the foſs to the top of
" the hedge, about four feet and a half, which they can hardly reach over

" to crop the Quick, as they might in the old way; and beſides, ſuch an
" hedge will endure a year longer. I have at this preſent time an hedge
" which has ſtood theſe five years; and tho' nine or ten feet be ſufficient
" for both ditches and bank, yet where the ground is but indifferent, it is
" better huſbandry to take twelve feet, which will allow of a bank at leaſt
" ſix feet broad, and gives more ſcope to place the dead hedges farther
" from the ſets, and the ditches being ſhallow, will, in two years time,
" graze; though I confine myſelf for the moſt part to nine or ten, becauſe
" I would take off the only objection of waſting ground by this way,
" ſhould others follow it. In reply to this, I affirm, That if you take
" twelve feet in breadth, for ditch and bank, you waſte more ground than
" by the common way: For in that a Quick is rarely ſet, but there is
" nine feet between the dead hedges, which is entirely loſt all the time of
" fencing: When as with double ditches, there remains at leaſt eighteen
" inches on each ſide where the turfs were ſet on edge, that bear more
" graſs than when it lay on the flat. But admitting it did totally lay waſte
" three feet of ground, the damage were very inconſiderable, ſince forty
" perches, in length two hundred and twenty yards, which make perches
" 7, 25″, 9′, or 7 poles $\frac{1}{4}$, at thirteen ſhillings and fourpence the acre,
" amounts not to 7 d. $\frac{1}{2}$ *per Ann.* Now that this is not only the beſt but
" cheapeſt way of Quick-ſetting, will appear by comparing the charge
" of both: In the uſual way, the charge of a three feet ditch is fourpence
" per pole, the owner providing ſets; if the workman finds them, he will
" have for making the ſaid ditch, and ſetting them, eightpence the pole,
" and for hedging twopence; that is, for both ſides fourpence the pole,
" which renders the charge of hedging, ditching, and ſets, twelvepence
" the pole; that is, for forty rods in length, forty ſhillings: then one
" load of wood out of the copſe coſts us, with the carriage, (though but
" two or three miles diſtance) ten ſhillings, which will ſeldom hedge above
" eight poles (ſingle hedge). But allowing it to do ten, to fence forty
" poles there muſt be at leaſt eight load of wood, which coſts four pounds,
" making the whole expence for ditching, ſetting, and fencing of forty
" poles to be ſix pounds, reckoning with the leaſt; for I know not any
" that will undertake to do it under three ſhillings and ſixpence per pole,
" and then the forty poles coſt ſeven pounds. Whereas, with double
" ditches, both of them, ſetting and ſets, will be done for eightpence per
" pole, and the huſbandman get as good wages as with a ſingle ditch, (for
" tho' the labour about them is more, yet the making the table is ſaved)
" which coſts one pound ſix ſhillings and eightpence. And the hedges be-

Book II. " ing but low, they will make better wages at hedging for a penny the " pole, than at twopence for common hedges, which comes to ſix ſhillings " and eightpence for hedging forty poles on both ſides: Thus one load of " wood will fence thirty poles at leaſt, and forty hedged with two thirds " of wood leſs than in the other way, and coſt but one pound ſix ſhillings " and eightpence, which makes the whole charge of ſets, ditching, fen- " cing, and wood, but three pounds."

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Hitherto this obliging and induſtrious Gentleman.

To other uſes: The root of an old Thorn is excellent both for boxes and combs, and is curiouſly and naturally wrought: I have read that they made ribs to ſome ſmall boats or veſſels with the White Thorn; and it is certain, that if they were planted ſingle, and in ſtandards, where they might be ſafe, they would riſe into large bodied trees in time, and be of excellent uſe for the Turner, not inferior to Box. It was accounted among the fortunate trees, and therefore uſed in *Faſces Nuptiarum*, ſince the jolly ſhepherds carried the White Thorn at the Rapine of the Sabines.

The diſtilled water, or ſtone and kernel of the Haw reduced to powder, is generally agreed to be ſovereign againſt the ſtone. The Black Crab, rightly ſeaſoned and treated, is famous for walking-ſtaves, and if overgrown, is uſed in mill-work; yea, and for rafters of great ſhips. Here we owe due Eulogy to the induſtry of the late Lord Shafteſbury, who has taught us to make ſuch incloſures of Crab-ſtocks only, planted cloſe to one another, as there is nothing more impregnable and becoming; or you may ſow Cyder-kernels in a rill, and fence it for a while with a double dry hedge, not only for a ſudden and beautiful, but a very profitable incloſure; becauſe, amongſt other benefits, they will yield you Cyder-fruit in abundance. But in Devonſhire they build two walls with their ſtones, ſetting them edge-ways, two, and then one between; and ſo as it riſes, fill the interval, or cofer, with earth, (the breadth and height as you pleaſe) continuing the ſtone-work, and filling; and, as you work, beating in the ſtones flat to the ſides, they are made to ſtick everlaſtingly. This is

abſolutely the neateſt, moſt ſaving, and profitable fencing imaginable, where ſlaty ſtones are in any abundance; and it becomes not only the moſt ſecure to the lands, but the beſt for cattle, to lie warm under the walls; whilſt other hedges, be they ever ſo thick, admit of ſome cold winds in winter-time when the leaves are off. Upon theſe banks they plant not only Quick-ſets, but even Timber-trees, which exceedingly thrive, being out of all danger.

PYRACANTHA.

The Pyracantha, Paliurus, and like precioufer ſorts of Thorn and robuſt Evergreens adorned with Caralin Berries, might eaſily be propagated by ſeeds, layers, or cuttings, into plenty ſufficient to ſtore even theſe vulgar uſes, were men induſtrious; and then, how beautiful and ſweet would the environs of our fields be! for there are none of the ſpinous ſhrubs more hardy, none that make a more glorious ſhew, nor fitter for our defence, competently armed, eſpecially the Rhamnus, which I therefore join to the Oxyacantha, for its terrible and almoſt irreſiſtible ſpines, able almoſt to pierce a coat of mail; and for this made uſe of by the malicious Jews, to crown the ſacred temples of our Bleſſed Saviour, and is yet preferred among the moſt venerable relicks in St. Chapel at Paris, as is pretended by the Devotees, &c. and hence has the tree (for it ſometimes exceeds a ſhrub) the name of *Chriſt's Thorn*. Thus might Barberries now and then be alſo inſerted among our hedges, which, with the Hips, Haws, and Cornel Berries, do well in light lands, and ſhould rather be planted to the ſouth than north or weſt, as uſually we obſerve them.

Some, as we noted, mingle their very hedges with Oaklings, Aſh, and Fruit-trees, ſown or planted, and it is a laudable improvement; though others do rather recommend to us ſets of all one ſort, and will not ſo much as admit of the Black Thorn to be mingled with the White, becauſe of their unequal progreſs; and indeed, Timber-trees ſet in the hedge (though contemporaries with it) do frequently wear it out: And therefore I ſhould rather encourage ſuch plantations to be at ſome yards diſtance, near the verges, than perpendicularly in them. Laſtly, if in planting any the moſt robuſt foreſt-trees (eſpecially Oak, Elm, Cheſnut) at competent ſpaces, and in rows, you open a ring of ground, at about four feet diſtance from the ſtem, and prick in Quick-ſet plants, you may after a while keep them clipped, at what height you pleaſe: They will appear exceedingly beautiful to the eye, prove a good fence, and yield uſeful buſh, bavin,

Book II. and (if you maintain them unſhorn) Hips and Haws in abundance; this ſhould therefore eſpecially be practiſed, where one would invite the birds.

In Cornwal they ſecure their lands and woods with high mounds, and on them they plant acorns, whoſe roots bind in the looſer mould, and ſo form a double and moſt durable fence, incircling the fields with a coronet of trees. They do likewiſe, and that with great commendation, make hedges of our Geniſta Spinoſa, prickly Furze, of which they have a taller ſort, ſuch as the French employ for the ſame purpoſe in Bretaign, where they are incomparable huſbands.

Furze. Furze is to be ſown (which is beſt) or planted of the roots in a furrow: If ſown, weed till it be ſtrong; both tonſile, and to be diligently clipped, which will render it a very thick, excellent, and beautiful hedge; otherwiſe, permitted to grow at large, it will yield very good faggot: It Is likewiſe admirable covert for wild fowl, and will be made to grow even in moiſt as well as dry places. The young and tender tops of Furzes, being a little bruiſed, and given to a lean ſickly horſe, will ſtrangely recover and plump him. Thus, in ſome places, they ſow in barren grounds, when they lay them down, the laſt crop with this ſeed, and ſo let them remain till they break them up again, and, during that interim, reap conſiderable advantage: Would you believe (writes a worthy correſpondent of mine) that in Herefordſhire, famous for plenty of wood, their thickets of Furzes, viz. the Vulgar, ſhould yield them more profit than a like quantity of the beſt wheat-land of England? for ſuch is theirs. If this be queſtioned, the ſcene is within a mile of Hereford, and proved by anniverſary experience, in the lands, as I take it, of a Gentleman who is now one of the burgeſſes for that city. And in Devonſhire (the ſeat of the beſt huſbands in the world) they ſow on their worſt land, well plowed, the ſeeds of the rankeſt Furzes, which, in four or five years, becomes a rich wood: No provender, as we ſay, makes horſes ſo hardy as the young tops of theſe Furzes; no other wood ſo thick, nor more excellent fuel; and for ſome purpoſes alſo, yielding them a kind of timber to their more humble buildings, and a great refuge for fowl and other game. I am aſſured in Bretaign it is ſometimes ſown no leſs than twelve yards thick, for a ſpeedy, profitable, and impenetrable mound: If we imitated this huſbandry in the dry and hot barren places of Surry, and other parts of this nation, we might exceedingly ſpare our woods. I have bought the beſt ſort of French ſeed at the Shops in London. It ſeems that in the more eaſtern parts of Ger-

many, and eſpecially in Poland, this vulgar trifle, and even our common Broom is ſo rare, that they have deſired the ſeeds of them out of England, and preſerve them with extraordinary care in their beſt gardens. This I learn out of our Johnſon's Herbal; by which we may conſider, that what is reputed a curſe, and a cumber in ſome places, is eſteemed the ornament and bleſſing of another: but we ſhall not need go ſo far for this, ſince both Beech and Birch are almoſt as great ſtrangers in many parts of this nation, particularly Northampton and Oxfordſhire. Mr. Cook is much in praiſe of Juniper for hedges, eſpecially for the more elegant inclоſures, and we daily ſee how it is improved of late.

BROOM.

Geniſta Scoparia. Broom. This is another improvement for barren grounds, and ſaver of more ſubſtantial fuel: It may be ſown Engliſh, or (what is more ſweet and beautiful) the Spaniſh with equal ſucceſs. In the weſtern parts of France, and with us in Cornwal, is grows to an incredible height, (however our Poet gives it the epithet of *Humilis)* and ſo it ſeems they had it of old, as appears by Gratius's Geniſtæ Altinates, with which, as he affirms, they uſed to make ſtaves for their ſpears and hunting darts. The ſeeds of Broom vomit and purge, whilſt the buds and flowers, being pickled, are very grateful.

ELDER.

Sambucus. The Elder. This makes a conſiderable fence if ſet of reaſonable luſty truncheons, much like the Willow, and, as I have ſeen them maintained, laid with great curioſity; theſe far excel thoſe extravagant plantations of them about London, where the lops are permitted to grow without due and ſkilful laying. There is a ſort of Elder which has hardly any pith; this makes exceeding ſtout fences, and the timber very uſeful for cogs of mills, butchers' ſkewers, and ſuch tough employments. Old trees do in time become firm, and cloſe up the hollowneſs to an almoſt inviſible pith. But if the medicinal properties of the leaves, bark, berries, &c. were thoroughly known, I cannot tell what our countryman could ail, for which he might not fetch a remedy from every hedge, either for ſickneſs or wound: The inner bark of Elder, applied to any burning, takes out the fire immediately; that, or in ſeaſon the buds, boiled in water-grewel for a breakfaſt, has effected wonders in a fever; and the decoction is admirable to aſſuage inflammations and tetrous humours, and eſpecially the ſcorbut: But an extract, or theriaca, may be compoſed of the berries, which is not only efficacious to eradicate this epidemical incon-

Book II.

venience, and greatly to aſſiſt longevity, (ſo famous in the ſtory of Neander) but is a kind of catholicon againſt all infirmities whatever: and of the ſame berries is made an incomparable ſpirit, which drunk by itſelf, or mingled with wine, is not only an excellent drink, but admirable in the dropſy. In a word, the water of the leaves and berries is approved in the dropſy, every part of the tree being uſeful, as may be ſeen at large in Blockwitzius's Anatomy thereof. The ointment made with the young buds and leaves in May with butter, is moſt ſovereign for aches, ſhrunk ſinews, hæmorrhoids, &c. and the flowers macerated in vinegar, not only are of a grateful reliſh, but good to attenuate and cut raw and groſs humours. Laſtly, the fungus (which we call Jews-Ears) decocted in milk, or macerated in vinegar, is of known effect in the angina and ſores of the throat. And leſs than this could I not ſay (with the leave of the charitable Phyſician) to gratify our poor wood-man; and yet when I have ſaid all this, I do by no means commend the ſcent of it, which is very noxious to the air; and therefore, though I do not undertake that all things which ſweeten the air are ſalubrious, nor all ill ſavours pernicious, yet, as not for its beauty, ſo neither for its ſmell, would I plant Elder near my habitation; ſince we learn from Bieſius *, that a certain houſe in Spain, ſeated amongſt many Elder trees, diſeaſed and killed almoſt all the inhabitants, which when at laſt they were grubbed up, became a very wholeſome and healthy place. The Elder does likewiſe produce a certain green fly, almoſt inviſible, which is exceedingly troubleſome, and gathers a fiery redneſs where it attacks.

* De Aeris poteſtate.

Spindle-Tree.

Euonymus. Spindle-tree. This is a ſhrub which commonly grows in our hedges, and bears a very hard wood, of which they ſometimes make bows for viols, and the Inlayer uſes it for its colour, and Inſtrument-makers for toothing of organs and virginal-keys, tooth-pickers, &c. What we elſe do with it I know not, ſave that (according to its name, abroad) they make ſpindles with it. I alſo learn, that three or four of the berries purge both by vomit and ſiege, and the powder, made of the berry, being baked, kills nits, and cures ſcurfy heads. Matthiolus ſays the poor people about Trent preſs oil out of the berries, wherewith to feed their lamps: But why they were wont to ſcourge parricides with rods made of this ſhrub, before they put them into the ſack, ſee Modeſtinus, L. penult SS. ad Legem Pomp. de Parricid. cited by Mr. Ray. Here might come in, or be named at leaſt, Wild Cornel, or Dog-wood, good to make mill-cogs, peſtles, bobins for bone-lace, ſpokes for wheels, &c. alſo the beſt

Dogwood.

skewers for butchers, because it does not taint the flesh, and is of so very hard a substance as to make wedges to cleave and rive other wood with instead of iron. The Viburnum, or Way-faring tree, growing plentifully in every corner, makes pins for the yokes of oxen; and superstitious people think that it protects their cattle from being bewitched, and plant the shrub about their stalls: It is certainly the most pliant and best bands to faggot with. The leaves and berries are astringent, and make an excellent gargle for loose teeth, sore throats, and stop fluxes. The leaves decocted to a lye, not only colour the hairs black, but fasten their roots; and the bark of the root, macerated under ground, well beaten, and often boiled, serves for bird-lime. CH. VII. VIBURNUM.

The American Yucca is a hardier plant than we take it to be; for it will suffer our sharpest winter, as I have seen by experience, without that trouble and care of setting it in cases in our Conservatories of hyemation; such as have beheld it in flower (which is not indeed till it be of some age) must needs admire the beauty of it; and it being easily multiplied, why should it not make one of the best and most ornamental fences in the world for our gardens, with its natural palisadoes, as well as the more tender and impatient of moisture, the Aloe, does for their vineyards in Languedoc? But we believe nothing improvable, save what our grandfathers taught us. Finally, let trial likewise be made of that Thorn, mentioned by Capt. Liggon in his History of Barbadoes, whether it would not be made grow amongst us, and prove as convenient for fences as there, the seeds or sets being transported to us with due care. And thus, having accomplished what, by your commands, I had to offer concerning the propagation of the more solid, material, and useful trees, as well the dry as aquatical, and to the best of my talent fenced our plantation in, I should here conclude, and set a bound likewise to my discourse, by making an apology for the many errors and impertinencies of it, did not the zeal and ambition of this illustrious Society to promote and improve all attempts which may concern publick utility or ornament, persuade me, that what I am adding for the farther encouragement to the planting of some other useful (though less vulgar) trees, will at least obtain your pardon, if it miss of your approbation *. YUCCA.

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* This Discourse on Forest-Trees was undertaken at the request of the Royal Society in the year 1664, and greatly contributed to the reputation of that learned body.

BOOK II. FRUIT-TREES.

To diſcourſe in this ſtyle of all ſuch Fruit-trees as would prove of greateſt emolument to the whole nation, were to deſign a juſt volume; and there are directions already ſo many, and ſo accurately delivered and publiſhed, (but which cannot be affirmed of any of the former claſſes of foreſt-trees, and other remarks, at the leaſt to my poor knowledge and reſearch) that it would be needleſs to repeat.

I do only wiſh (upon the proſpect and meditation of the univerſal benefit) that every perſon whatever, worth ten pounds *per Annum*, within her Majeſty's dominions, were, by ſome indiſpenſable ſtatute, obliged to plant his hedge-rows with the beſt and moſt uſeful kinds of them, eſpecially in ſuch places of the nation, as being the more inland counties, and remote from the ſeas and navigable rivers, might the better be excuſed from the planting of timber, to the proportion of thoſe who are more happily and commodiouſly ſituated for the tranſportation of it.

Undoubtedly, if this courſe were taken effectually, a very conſiderable part both of the meat and drink, which is ſpent to our prejudice, might be ſaved by the country people, even out of the hedges and mounds, which would afford them not only the pleaſure and profit of their delicious fruit, but ſuch abundance of cyder and perry, as ſhould ſuffice them to drink of one of the moſt wholeſome and excellent beverages in the world.

Old Gerard did long ſince alledge us an example worthy to be purſued: "I have ſeen, ſaith he, (ſpeaking of Apple trees, lib. iii. cap. ci.) in the "paſtures and hedge-rows about the grounds of a worſhipful Gentleman, "dwelling two miles from Hereford, called Mr. Roger Bodnome, ſo many "trees of all ſorts, that the ſervants drink for the moſt part no other "drink but that which is made of apples: The quantity is ſuch, that by "the report of the Gentleman himſelf, the Parſon hath for tithe many hogſ-"heads of cyder; the hogs are fed with the fallings of them, which are "ſo many, that they make choice of thoſe apples they do eat, and will "not taſte of any but of the beſt. An example doubtleſs to be followed "of Gentlemen that have land and living: But *Envy* ſaith, the poor will "break down our hedges, and we ſhall have the leaſt part of the fruit. "But foreward, in the name of God, graff, ſet, plant, and nouriſh up "trees in every corner of your ground; the labour is ſmall, the coſt is "nothing, the commodity is great; yourſelves ſhall have plenty, the poor "ſhall have ſomewhat in time of want to relieve their neceſſity, and God

" ſhall reward your good mind and diligence."—Thus far honeſt Gerard. And, in truth, with how ſmall a charge and infinite pleaſure this were to be effected, every one that is patron of a little nurſery can eaſily calculate: For by this expedient many thouſands of acres, ſowed now yearly with barley, might be cultivated for wheat, or converted into paſture, to the increaſe of corn and cattle. Beſides, the timber which the Pear tree, Black Cherry, and many thorny Plums (which are beſt for grain, colour, and gloſs) afford, comparable, for divers curious uſes, with any we have enumerated. The Black Cherry Wood grows ſometimes to that bulk as is fit to make ſtools with, cabinets, tables, eſpecially the redder ſort, which will poliſh well, alſo pipes and muſical inſtruments; the very bark is employed for bee-hives. I would farther recommend the more frequent planting and propagation of Fir, Pine trees, and ſome other beneficial materials, both for ornament and profit; eſpecially ſince we find by experience they thrive ſo well where they are cultivated for curioſity only.

I have now finiſhed my planting. A word or two concerning the preſervation of the trees, and the cure of their infirmities, expect in the next chapter.

CHAP. VIII.

Of the INFIRMITIES *of* TREES, *&c.* *

BOOK II. SO many are the infirmities and ſickneſſes of trees, and indeed infirmities of the whole family of vegetables, that it were almoſt impoſſible to enumerate and make a juſt catalogue of them, and as difficult to find ſuch infallible cures and remedies as could be deſired, the effects ariſing from ſo many, and ſuch different cauſes. Whenever, therefore, our trees and plants fail and come ſhort of the fruit and productions we expect of them, (if the fault be not in our want of care) it is certainly to be attributed to thoſe infirmities to which all elementary things are obnoxious, either from the nature of the things themſelves, and in themſelves, or from ſome outward injury, not only through their being unſkilfully cultivated by men, and expoſed to hurtful beaſts, but ſubject to be preyed upon and ruined by the moſt minute and deſpicable inſects, beſides other caſualties and accidents innumerable, according to the ruſtick rhime:

The Calf, the Wind-ſhock, and the Knot,
The Canker, Scab, Scurf, Sap, and Rot,

affecting the ſeveral parts. Theſe invade the roots; ſtony and rocky grounds, Ivy, and all climbers, weeds, ſuckers, fern, wet, mice, moles, winds, &c.

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* Vegetables cannot be ſuppoſed to be ſubject to infirmities, unleſs we allow them to be organized bodies, and endued with life. That they have life, may be proved from the following conſiderations: 1. Their Motion; 2. Anatomy; 3. Generation; 4. Age; 5. Diſeaſes; 6. Death.

1. MOTION. It is evident that a dead body has no motion of its own; if therefore any body has ſpontaneous motion, it muſt alſo have life: For proper and internal motion in every body depends on the ſpontaneous propulſion of fluids, and where ſuch a propulſion of fluids is, there is life. That there is motion in plants is apparent to every one; *e. g.* herbs in green-houſes or ſtoves incline or turn towards the light. When ſhut up, if they find a hole in the wall, ſhutters, or frames, there they endeavour to penetrate. Several plants, eſpecially thoſe with compound yellow flowers, during the whole day turn their flowers towards the ſun; to wit, to the eaſt in the morning, to the ſouth at noon, and to the weſt toward evening; and this is obſervable in the *Sonchus Arvenſis*, Tree Sow-Thiſtle. I believe every body knows, that the greateſt number of plants in a ſerene ſky expand their flowers, and, as it were, with cheerful looks behold the light of the ſun; but before rain they ſhut them up; *e. g.* the Tulip. The flowers of the *Draba Alpina*, Alpine Whitlow Graſs, the *Parthenium*

To theſe may be added ſiderations, peſtiferous air, fogs, exceſſive heat, ſulphurous and arſenic ſmoak and vapours, and other plagues, tumours, diſtortions, lacrymations, tophi, gouts, carbuncles, ulcers, crudities, fungoſities, gangrenes, and an army more, wherof ſome are hardly diſcernable, yet enemies, which not foreſeen, makes many a bargain of ſtanding wood, though ſeemingly fair, very coſtly ware: In a word, whatſoever is exitial to men is ſo to trees; for the averſion of which they had, of old, recourſe to the Robigalia and other Gentile ceremonies: but no longer abuſed by

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foliis ovatis crenatis, Baſtard Feverfew with egg-ſhaped crenated leaves, and the *Trientalis*, or Winter-green, hang down in the night, as if the plants were aſleep, leſt rain or the moiſt air ſhould injure the fertilizing duſt. The Trefoils, and one ſpecies of Wood-ſorrel, ſhut up or double their leaves before ſtorms and tempeſts, but in a ſerene ſky expand or unfold them, ſo that from them the huſbandman can pretty clearly foretel an approaching ſtorm. And it is well known that the *Bauhinia*, or Mountain Ebony, Senſitive Plants, and *Caſſia*, obſerve the ſame rule. The flowers of Goat's Beard open in the morning at the approach of the ſun, and ſhut about noon; hence it is called John-go-to-bed-at-noon. *Parkinſonia*, Tamarind tree, *Æſchynomene*, or Baſtard Senſitive Plant, and ſeveral others of the *Diadelphia* claſs, in ſerene weather expand their leaves in the day-time, and contract them in the night. The Tamarind tree is ſaid, by Alpinus and Acoſta, to enfold within its leaves the flowers or fruit every night, to guard them from cold or rain. This ſeemed like a paradox to Syenus and Ray: but the flower-ſtalk with the flower or fruit lies upon the winged leaves from the boſom of which it ſprings; hence it is, that while the leaves fold themſelves up every night, they ſhut up or encloſe the fructification within them. Some of the *Mimoſæ*, or Senſitive Plants, and the *Oxalis*, or Wood-ſorrel with pinnated leaves, upon being touched roll up their leaves, and turn downwards or ſhrink, and after a little ſpace extend them again, as if they had both life and ſenſation. As it cannot be denied, but that man, or any other animal, deſtitute of motion, grows pale and weak; ſo, on the other hand, it is a certain truth, that motion or exerciſe renders them florid, ſtout, fat, and healthy; ſince exerciſe enlarges the limbs, as Avicenna rightly obſerves. Hence the ruſtic excels the courtier in ſtrength of body and largeneſs of limbs, being uſed to much walking, and other exerciſe; and it is well known that the right hand of mechanics, and other people inured to labour, is for the moſt part bigger than the left. Theſe obvious truths need no laboured demonſtration. With plants it is the ſame. Theſe in ſtoves and green-houſes, tho' they have ſufficient heat and nouriſhment, are ſlender, weak, and loſe the colour of their leaves, and ſeem to languiſh for want of motion: and trees, ſurrounded with high walls or buildings, and confined within narrow bounds, are ſlender, and grow tall, but not ſtrong. Pines in very thick woods, where the high winds have not free acceſs to ſhake them, grow tall and ſlender; while others planted in open fields, and frequently ſhaken by ſtormy winds, have not only

Book II. charmers and ſuperſtitious fopperies, we have, in this chapter, endeavoured to ſet down and preſcribe the beſt and moſt approved remedies hitherto found out, as well natural as artificial.

And *firſt*, Weeds are to be diligently pulled up by hand after rain, whilſt your ſeedlings are very young, and till they come to be able to kill them with ſhade and over-dripping; and then are you, for the obſtinate, to uſe the hoe, fork, and ſpade to extirpate Dog-graſs, Bear-bind, &c.

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thick and ſtrong ſtems, but alſo ſtrike deep root, and raiſe beautiful and ſpreading branches.

2. Anatomy. Malpighi and Grew, unknown to each other, undertook the anatomy of plants nearly about the ſame time. Many things, however, have been found out ſince their days——and many things remain yet to be diſcovered.

The general and obvious parts of a plant are five. The root; the ſtem; the branches; the leaves; the flower. The component parts of theſe diviſions are ſimple in compariſon to the animal body. The offices of a vegetable being only increaſe and fructification, there was no neceſſity for a complicated ſtructure.—A good microſcope diſcovers the conſtituent parts of a plant to be, 1. A very thin outer rind. 2. An inner rind, much thicker than the former. 3. A blea, of a ſpongy texture. 4. A vaſcular ſeries. 5. A fleſhy ſubſtance, which anſwers to the wood of a tree, or ſhrub. 6. Pyramidal veſſels contained within the fleſh. And, 7. A pith.—Whatever part of the plant we examine, we obſerve theſe, and no more. The root, its aſcending ſtalk, and deſcending fibre, are one, and not three ſubſtances. This reduces the entire vegetable to one body; and what appears in the flower to be many parts, are only the extremities of the ſeven above-mentioned. The cup terminates the outer bark. The inner rind ends in the outer petals. The blea forms the inner petals. The vaſcular ſeries ends in the nectaria. The fleſh makes the filaments. The pyramidal veſſels form the receptacle. The pith furniſhes the ſeeds and their capſules.—Words not being able to convey an adequate idea of theſe parts, I muſt beg leave to refer the reader to the excellent engravings of Dr. Hill, as publiſhed in his Vegetable Syſtem.—As I apprehend that his reſearches into the vegetable creation are more minute than thoſe of his predeceſſors, I have followed him in the enumeration of the conſtituent parts of a plant. He has juſtly recommended the Black Helebore as the propereſt ſubject for diſſection. It is a perennial plant of a firm texture, and not too complex, conſiſting only of a root, radical leaves, and a flower ſtem.

A careful maceration of the parts, a good microſcope, and a moſt delicate touch, are eſſentially neceſſary towards inveſtigating the ſtructure of vegetable bodies.—Trees, ſhrubs, and herbs are organized in the ſame manner; but the colour and thickneſs of their component parts are different, according to their reſpective natures.

The outer bark is the firſt thing that preſents itſelf to our view. It has the appearance of a fine film full of irregular meſhes, though in reality it conſiſts of two mem-

And here, mentioning ſhade and dripping, though I cannot properly ſpeak of them as infirmities of trees, they are certainly the cauſes of their unthriving till removed; ſuch as that of the Oak and Maſt-holme, Walnut, Pine, Fir, &c. the thickneſs of the leaves intercepting the ſun and rain; whilſt that of other trees is good, as the Elm, and ſeveral others.

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branes, with a ſeries of veſſels between them. Theſe take their courſe upwards, and as they advance towards the cup of the flower, inoſculate with the ſmall veſſels of the inner bark, into which they pour part of the juices they have received from the earth and the atmoſphere. The fine meſhes ſerve the purpoſes of inhalent or exhalent pores, according to the circumſtances of the weather.—The inner bark is much thicker than the outer. It is made up of ſeveral flakes laid evenly upon one another, each of which conſiſts of two membranes incloſing a ſeries of veſſels. Theſe communicate freely through the whole ſubſtance of the rind, and as they inoſculate with the veſſels of the outer bark, ſo they alſo communicate with thoſe of the blea.—The blea lies immediately under the inner bark. It is one compleat and ſingle ſubſtance, uniform in its ſtructure. It is of a conſiderable thickneſs, and is made up of beds of hexagonal cells. In the angles formed by theſe cells, we obſerve the veſſels of the blea. They pour their contents into the cells, which appear to be reſervoirs for the water imbibed by the plant.—Underneath the blea, lies the fourth ſubſtance called the Vaſcular Series. Its ſtructure is extremely ſimple, being a ſingle courſe of greeniſh veſſels lodged between two membranes. It terminates in the nectaria. At a certain ſeaſon of the year, the juices of the vaſcular ſeries are very mucilaginous. They are particularly ſo in the Holly, and ſeem to be more elaborated than thoſe of the blea. Its veſſels have a free communication with the wood and blea.—The favourers of a circulation aſſert that, through theſe veſſels, the returning ſap deſcends; but by the moſt accurate experiments of Dr. Hales, it appears that the vegetable juices do riſe and fall in the ſame ſeries of veſſels, and conſequently have no circulation.

The wood, or fleſhy part of a plant, comes next to be examined. In this the life of the vegetable ſeems to be placed. It is univerſal in the plant, and is made up of ſtrong fibres. From it all the other parts are produced. It ſhoots a pith inward, and a rind, blea, and vaſcular ſeries outward. The filaments in the flower, which are eſſential parts in the production of new plants, are continuations of it. And as the ſeed-veſſels are portions of the pith, ſo are the petals and nectaria continuations of the rind, blea, and vaſcular ſeries; all which the plant ſhoots outward. Through every part of the wood, or fleſh, there are veſſels that carry a juice highly elaborated, the greateſt part of which has undergone the concoction of the rinds, blea, and vaſcular ſeries. The woody fibres conſtitute an order of veſſels, which are named Tracheæ. Theſe are filled with elaſtic air, and may be diſcovered, by the eye, in the wood of all trees. The Trachcæ make up an arterial ſyſtem, and ſupply the place of the heart in animals. Being filled with air, they become ſubject to the alternacies of heat and cold. Their uſe ſhall be explained hereafter.—The pyramidal veſſels are

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Secondly, Suckers ſhall be duly eradicated, and with a ſharp ſpade dexterouſly ſeparated from the mother-roots, and tranſplanted in convenient places for propagation, as the ſeaſon requires.

Here note, That fruit graffed upon ſuckers are more diſpoſed to produce ſuckers, than ſuch as are propagated upon good ſtocks.

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ſpread through all the ſubſtance of the fleſh, and, as they advance upwards, their ramifications inoſculate, ſo as to prevent any poſſible obſtruction of the ſap. Their juices, as I have obſerved, are highly elaborated, having paſſed through all the orders of ſap-veſſels. It will here be neceſſary to remark, that the ſides of theſe veſſels are conſtantly in contact with the Tracheæ; ſo that, from the nature of their ſituation, they muſt, at all times, be ſubject to the viciſſitudes of the weather. The pyramidal veſſels communicate with the pith, which remains to be deſcribed.—The pith is to be found in all trees, ſhrubs, and plants. It occupies the centre, but is not always regularly continued. When examined by a microſcope, it has the appearance of a number of veſicles, and is of an uniform ſtructure. It does not appear to be abſolutely neceſſary to vegetation, as we often obſerve Elms, and other trees, to live and thrive without it. In trees, it is found in the branches, being obliterated in the trunk. The veſſels of the fleſh communicate with it. From them it receives a fluid; and probably it is the receptacle of ſome part of the ſap. In extreme dry weather ſuch a ſtore may be neceſſary.—Tranſverſe ſections of the ribs of leaves diſcover it. When minutely traced, it is found to run up to the ovarium, where it forms the ſeeds and their capſules.—From this ſurvey of the anatomy of a plant, it is evident that there is a correſpondence between all its parts. By means of a variety of ſtrainers, different juices are prepared from the ſame maſs. Matter, conſidered as matter, has no ſhare in the qualities of bodies. It is from the arrangement of it that we have ſo many different ſubſtances in nature. We may eat the earth, and we may drink the water that moiſtens it, and yet, from the modification of its parts, it is capable of producing both bread and poiſon.—We reaſon improperly, when we ſay that every plant takes from the earth ſuch particles as are natural to it. A Lemon ingrafted upon an Orange ſtock, is capable of changing the ſap of the Orange into its own nature, by a different arrangement of the nutritive juices. A maſs of innocent earth can give life and vigour to the bitter Aloe, and to the ſweet Cane; to the cool Houſe-Leek, and to the fiery Muſtard; to the nouriſhing Grains, and to the deadly Night-ſhade.—The fibres of a root are ſuppoſed to be ſimple capillary tubes; but, upon a minute inſpection, we diſcover them to conſiſt of the ſeven component parts of the plant. At their extremities we obſerve a ſpongy kind of excreſcence pierced with innumerable ſmall holes. Through theſe the nutritive juices of the earth are abſorbed. When a plant has been pulled up, it will be retarded in its growth, until nature has renewed that ſpongy nipple.—The bark and leaves of a plant imbibe, at proper ſeaſons, the moiſture of the atmoſphere. At other times they perſpire the ſuperfluous nouriſhment. This opens to our view an extenſive proſpect of the vegetable œcono-

Thirdly, Fern is beſt deſtroyed by ſtriking off the tops, as Tarquin did the heads of the Poppies: This done with a good wand or cudgel, at the decreaſe in the ſpring, and now and then in ſummer, kills it, as alſo it does Nettles in a year or two, (but moſt infallibly by being eaten down, at its ſpring, by Scotch ſheep) beyond the vulgar way of mowing or burning, which rather increaſes than diminiſhes it.

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my.—We have already ſeen that all the parts of a plant are the ſame. They only differ in ſhape. The roots are formed ſharp and pointed, to make their paſſage eaſier thro' the earth. The leaves are made broad to catch the moiſture of the air with more readineſs. When the root of a tree happens to be elevated, inſtead of being retained within the earth, it aſſumes the appearance of a perfect plant, with leaves and branches. Experiments ſhew us that a young tree may have its branches placed in the earth, and its roots elevated in the air; and in that inverted ſtate it will continue to live and grow.—The air contains, eſpecially during the ſummer months, all the principles of vegetation. Oil for the perfect food, water to dilute it, and ſalts to aſſimilate it. Theſe are greedily abſorbed by the veſſels of the leaves and bark, and conveyed to the innermoſt parts of the plant for its growth and fructification. When the air happens to be cold and moiſt, this abſorption takes place. When it is hot and dry, the ſame veſſels throw off the ſuperfluous moiſture by perſpiration. In animals, the kidneys and pores of the ſkin carry off the ſuperfluity. The vegetable not having kidneys, perſpires more than the animal. Dr. Hales has demonſtrated that this perſpiration is conſiderable. I ſhall here tranſcribe his ſtatical experiments upon the Sun-flower, for the benefit of thoſe who may not have an opportunity of examining the original.

" July 3, 1724, in order to find out the quantity imbibed and perſpired by the " Sun-flower, I took a garden-pot (Plate 1. Fig. 5.) with a large Sun-flower, *a*, " 3 feet $+\frac{1}{2}$ high, which was purpoſely planted in it when young: It was of the large " annual kind.—I covered the pot with a plate of thin milled lead, and cemented all " the joints faſt, ſo as no vapour could paſs, but only air, thro' a ſmall glaſs tube, *b*, " nine inches long, which was fixed purpoſely near the ſtem of the plant, to make " a free communication with the outward air, and that under the leaden plate.—I " cemented alſo another ſhort glaſs tube, *c*, into the plate, two inches long, and one " inch in diameter. Through this tube I watered the plant, and then ſtopped up " alſo the holes, *d*, *e*, at the bottom of the pot with corks.—I weighed this plant and " pot morning and evening, for fifteen ſeveral days, from July 3, to Auguſt 8, after " which I cut off the plant cloſe to the leaden plate, and then covered the ſtump " well with cement; and upon weighing found there perſpired through the unglazed " porous pot two ounces every twelve hours day; which being allowed in the daily " weighing of the plant and pot, I found the greateſt perſpiration of twelve hours in " a very warm dry day to be one pound fourteen ounces; the middle rate of perſpira- " tion, one pound four ounces. The perſpiration of a dry warm night, without any " ſenſible dew, was about three ounces; but when any ſenſible, though ſmall dew,

BOOK II. *Fourthly*, Over much wet is to be drained by trenches, where it infeſts the roots of ſuch kinds as require drier ground: but if a drip do fret into the body of a tree by the head, which will certainly decay it, cutting firſt the place ſmooth, ſtop and cover it with loam and hay, or a Cerecloth, till

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" then the perſpiration was nothing; and when a large dew, or ſome little rain in the " night, the plant and pot was increaſed in weight two or three ounces. [I uſed " avoirdupois weights.] I cut off all the leaves of this plant, and laid them in five " ſeveral parcels, according to their ſeveral ſizes, and then meaſured the ſurface of a " leaf of each parcel, by laying over it a large lattice made with threads, in which " the little ſquares were a quarter of an inch each; by numbering of which I had " the ſurface of the leaves in ſquare inches, which, multiplied by the number of the " leaves in the correſponding parcels, gave me the area of all the leaves; by which " means I found the ſurface of the whole plant, above ground, to be equal to 5616 " ſquare inches, or 39 ſquare feet.—I dug up another Sun-flower, nearly of the " ſame ſize, which had eight main roots, reaching fifteen inches deep and ſideways " from the ſtem: It had beſides a very thick buſh of lateral roots from the eight " main roots, which extended every way in a hemiſphere, about nine inches from the " ſtem and main roots.—In order to get an eſtimate of the length of all the roots, I " took one of the main roots with its laterals, and meaſured and weighed them; " and then weighed the other ſeven roots, with their laterals; by which means, I " found the ſum of the length of all the roots to be no leſs than 1448 feet.——And " ſuppoſing the periphery of theſe roots, at a medium, to be 0.131 of an inch, then " their ſurface will be 2276 ſquare inches, or 15.8 ſquare feet; that is equal to 0.4 of " ſurface of the plant above ground.—If, as above, twenty ounces of water, at a me- " dium, perſpired in twelve hours day, (i. e.) thirty-four cubick inches of water, " (a cubick inch of water weighing 254 grains) then the thirty-four cubick inches di- " vided by the ſurface of all the roots, is=2286 ſquare inches (i. e.) $\frac{34}{2286}$ is $=\frac{1}{67}$; this " gives the depth of water imbibed by the whole ſurface of the roots, viz. $\frac{1}{67}$ part of an " inch.—And the ſurface of the plant above ground being 5616 ſquare inches, by " which dividing the thirty-four cubick inches, viz. $\frac{34}{5616}=\frac{1}{165}$, this gives the depth " perſpired by the whole ſurface of the plant above ground, viz. $\frac{1}{165}$ part of an inch. " Hence the velocity with which water enters the ſurface of the roots to ſupply the " expence of perſpiration, is to the velocity with which their ſap perſpires, as 165:67, " or as $\frac{1}{67}:\frac{1}{165}$, or nearly as 5:2.—The area of the tranſverſe cut of the middle of the " ſtem is a ſquare inch; therefore the areas, on the ſurface of the leaves, the roots and " ſtem, are 5616, 2276.1.——The velocities in the ſurface of the leaves, roots, and " tranſverſe cut of the ſtem, are gained by a reciprocal proportion of the ſurfaces.

" Area of { leaves=5616, roots =2276, ſtem = 1 } | velocity | = { $\frac{1}{5616}$, $\frac{1}{2276}$, 1 } or as { $\frac{1}{165}$ inch., $\frac{1}{67}$ inch., 34 inch. }

" Now, their perſpiring 34 cubick inches in twelve hours day, there muſt ſo much " paſs through the ſtem in that time; and the velocity would be at the rate of 34

a new bark ſucceed. But not only the wet, which is to be diverted by trenching the ground, is exitial to many trees, but their repletion of too abundant nouriſhment; and therefore ſometimes there may be as much occaſion to uſe the lancet as venæſection to animals; eſpecially if the hypotheſis hold, of ſuperfluous moiſture's deſcent into the roots, to be reconcocted; but where, in caſe it be more copious than can be there

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" inches in twelve hours, if the ſtem were quite hollow.——In order therefore to find " out the quantity of ſolid matter in the ſtem, July 27, at 7. *a. m.* I cut up even " with the ground a Sun-flower; it weighed 3 pounds; in thirty days it was very dry, " and had waſted in all 2 pounds 4 ounces; that is, $\frac{3}{4}$ of its whole weight; ſo here is " a fourth part left for ſolid parts in the ſtem, (by throwing a piece of green Sun- " flower ſtem into water, I found it very near of the ſame ſpecifick gravity with water) " which filling up ſo much of the ſtem, the velocity of the ſap muſt be increaſed pro- " portionably, viz. $\frac{1}{3}$ part more, (by reaſon of the reciprocal proportion) that 34 cu- " bick inches may paſs the ſtem in twelve hours; whence its velocity in the ſtem will " be $45\frac{1}{3}$ inches in twelve hours, ſuppoſing there be no circulation, nor return of the " ſap downwards.—If there be added to 34, (which is the leaſt velocity) $\frac{1}{3}$ of it $= 11\frac{1}{3}$, " this gives the greateſt velocity, viz. $45\frac{1}{3}$. The ſpaces being as 3 : 4. the velocities " will be 4 : 3 : : $45\frac{1}{3}$: 34.——But if we ſuppoſe the pores in the ſurface of the leaves " to bear the ſame proportion as the area of the ſap-veſſels in the ſtem do to the area " of the ſtem; then the velocity both in the leaves, root, and ſtem, will be increaſed " in the ſame proportion.—A pretty exact account having been taken of the weight, " ſize, and ſurface of this plant, and of the quantities it has imbibed and perſpired, " it may not be improper here to enter into a compariſon of what is taken in and per- " ſpired by a human body, and this plant.—The weight of a well-ſized man is equal " to 160 pounds: the weight of the Sun-flower is 3 pounds; ſo their weights are to " each other as 160 : 3, or as 53 : 1.——The ſurface of ſuch human body is equal to " 15 ſquare feet, or 2160 ſquare inches.—The ſurface of a Sun-flower is 5616 ſquare " inches; ſo its ſurface is, to the ſurface of a human body, as 26 : 10.—The quan- " tity perſpired by a man in twenty-four hours is about 31 ounces, as Dr. Keill found. " *Vid. Medic. Stat. Britan.* p. 14.—The quantity perſpired by the plant, in the ſame " time, is 22 ounces, allowing two ounces for the perſpiration of the beginning and " ending of the night in July, viz. after evening, and before morning weighing, juſt " before and after night.——So the perſpiration of a man to the Sun-flower is as " 141 : 100.——Abating the ſix ounces of the thirty-one ounces, to be carried off by " reſpiration from the lungs in the twenty-four hours (which I have found by certain " experiment to be ſo much, if not more); the twenty-five ounces multiplied by 438, " the number of grains in an ounce avoirdupois, the product is 10,950 grains; which " divided by 254, the number of grains in a cubick inch of water, gives 43 cubick " inches perſpired by a man: which divided by the ſurface of his body, viz. 2160 " ſquare inches, the quotient is nearly $\frac{1}{50}$ part of a cubick inch perſpired off a ſquare

Book II. elaborated, it turns to corruption, and ſends up a tainted juice, which perverts the whole habit of the tree: In this exigence therefore, it were, perhaps, more adviſable to draw it out by a deep inciſion, and to depend upon a new ſupply, than, upon confidence of correcting this evil quality by other medications, to let it periſh. Other cauſes of their ſickneſs, not always taken notice of, proceed from too liberal refreſhments and over-

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" inch in twenty-four hours. Therefore in equal ſurfaces, and equal times, the man " perſpires $\frac{1}{50}$, the plant $\frac{1}{165}$, or as 50 : 15.—Which exceſs in the man is occaſioned " by the very different degrees of heat in each; for the heat of the plant cannot be " greater than the heat of the circumambient air, which heat in ſummer is from 25 to " 35 degrees above the freezing point; but the heat of the warmeſt external parts of " a man's body is 54 ſuch degrees, and the heat of the blood 64 degrees; which is " nearly equal to water heated to ſuch a degree as a man can well bear to hold his " hand in, ſtirring it about; which heat is ſufficient to make a plentiful evaporation.

" *Qu.* Since then the perſpirations of equal areas in a man and a Sun-flower are to " each other as 165 : 50; or as $3\frac{1}{3}$: 1; and ſince the degrees of heat are as 2 : 1, muſt " not the ſum or quantity of the areas of the pores lying in equal ſurfaces, in the man " and Sun-flower, be as $1\frac{1}{3}$: 1? for it ſeems that the quantities of the evaporated fluid " will be as the degrees of heat, and the ſum of the areas of the pores taken together.

" Dr. Keill, by eſtimating the quantities of the ſeveral evacuations of his body, " found that he eat and drank, every twenty-four hours, 4 pounds 10 ounces.—The " Sun-flower imbibed and perſpired in the ſame time 22 ounces; ſo the man's food, " to that of the plant, is as 74 ounces to 22 ounces, or as 7 : 2.——But, compared " bulk for bulk, the plant imbibes 17 times more freſh food than the man: for deduct- " ing 5 ounces, which Dr. Keill allows for the *fæces alvi*, there will remain 4 pounds " 5 ounces of freſh liquor, which enters a man's veins; and an equal quantity paſſes " off every twenty-four hours. Then it will be found that 17 times more new fluid " enters the ſap-veſſels of the plant, and paſſes off in twenty-four hours, than there " enters the veins of a man, and paſſes off in the ſame time.——And ſince, compared " bulk for bulk, the plant perſpires 17 times more than the man, it was therefore very " neceſſary, by giving it an extenſive ſurface, to make a large proviſion for a plentiful " perſpiration in the plant, which has no other way of diſcharging ſuperfluities; " whereas there is proviſion made in man, to carry off above half of what he takes in, " by other evacuations.——For ſince neither the ſurface of his body was extenſive " enough to cauſe ſufficient exhalation, nor the additional reek, ariſing from the heat of " his blood, could carry off above half the fluid which was neceſſary to be diſcharged " every twenty-four hours; there was a neceſſity of providing the kidneys to percolate " the other half through.—And whereas it is found that 17 times more enters, bulk " for bulk, into the ſap-veſſels of the plant, than into the veins of a man, and goes " off in twenty-four hours; one reaſon of this greater plenty of freſh fluid in the vege- " table than the animal body, may be, becauſe the fluid which is filtrated through the

watering in dry and ſcorching ſeaſons, eſpecially in nurſeries: The water ſhould therefore be fitly qualified, neither brackiſh, bitter, ſtagnant, or putrid, ſour, acrimonious, vitriolic, arenous and gravelly, churliſh, harſh, and lean (I mention them promiſcuouſly); and whatever vicious quality they are perceptibly tinctured and impregnated with, they are by no means proper drink for plants. Wherefore a very critical examen of this ſo neceſſary an element (the very principle, as ſome think, and only nutriment of

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" roots immediately from the earth, is not near ſo full freighted with nutritive particles " as the chyle which enters the lacteals of animals; which defect it was neceſſary to " ſupply by the entrance of a much greater quantity of fluid. And the motion of the " ſap is thereby much accelerated, which in the heartleſs vegetable would otherwiſe be " very ſlow; it having probably only a progreſſive and not a circulating motion, as " in animals. Since then a plentiful perſpiration is found ſo neceſſary for the health " of a plant or tree, it is probable that many of their diſtempers are owing to a ſtop- " page of this perſpiration by inclement air.——The perſpiration in men is often ſtop- " ped to a fatal degree; not only by the inclemency of the air, but by intemperance, " and violent heats and colds. But in the more temperate vegetable, perſpiration can " be ſtopped only by inclement air; unleſs by an unkindly ſoil, or want of genial " moiſture, it is deprived of proper or ſufficient nouriſhment.——As Dr. Keill obſer- " ved in himſelf a conſiderable latitude of degrees of healthy perſpiration, from a " pound and a half to 3 pounds; I have alſo obſerved a healthy latitude of perſpira- " tion in this Sun-flower, from 16 to 28 ounces, in twelve hours day. The more it " was watered, the more plentifully it perſpired, *(cæteris paribus)* and with ſcanty " watering the perſpiration much abated."

From theſe accurate experiments, it is evident that vegetables inſpire and expire. Pure air is neceſſary for animals. Vegetables require the ſame. When obliged to breathe their own vapours, they become unhealthy. For that reaſon corn is ſeldom good in ſmall incloſures; neither are trees healthy when much crouded. The ſuperior goodneſs of the grain produced by the drill and alternate huſbandry, evinces the neceſſity of a free circulation of air. There is a certain height to which the ſoil ought to raiſe the ears of corn. When, from too much cloſeneſs, they are elevated beyond that pitch, the real nouriſhment that ſhould go to the grain, is ſpent upon the ſtraw. The ſtems alſo, that ſhould have been hardened by the air, become weak, and unable to ſtand againſt moderate ſtorms of wind and rain.——The Culture of Beans ſhews the truth of this obſervation. When ſown too thick, they puſh themſelves upward with ſeeming vigour, and the crop has the appearance of being a good one. But when examined, we find the pods ſmall, and few in number. On the contrary, when ſown in drills, with proper intervals, the ſtraw is ſhorter, and the pods much larger, and more numerous. I do not argue for the drill huſbandry in general; but with regard to Beans, it is a rational and profitable practice.——Farmers may object to the difficulty of keeping the intervals clear of weeds. When hoers cannot be procured, ſheep

Book II. vegetables) is highly to be regarded, together with more than ordinary ſkill how to apply it: In order to which, the conſtitution and texture of plants and trees are philoſophically to be conſidered; ſome affecting macerations with dung and other mixtures, (which I ſhould not much commend) others quite contrary, the quick and running ſpring, dangerous enough, and worſe than ſnow-water, which is not in ſome caſes to be rejected: Generally, therefore, that were to be choſen, which, paſſing ſilently through ponds and other receptacles, is expoſed to the ſun and air. This approaches neareſt to that of rain dropping from the uberous cloud, and is

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are excellent weeders. The intervals, however, are beſt cleaned by the common horſe-hoe. A drill crop of Beans is always ſuperior to a crop ſown by the hand.—But to return to our philoſophical argument.——The analogy that ſubſiſts between plants and animals, has induced ſome very eminent naturaliſts to ſuppoſe a regular circulation of the vegetable juices. M. Perrault, M. Major, M. Marriotte, Malpighi, and our countryman Grew, contended, much about the ſame time, for the circulation of the ſap. According to their microſcopical obſervations, the wood of trees, and the fleſh of plants, conſiſt of fine capillary tubes, which run parallel from the root, through the trunk and branches. Theſe they looked upon as arteries. Other minute veſſels were obſerved running between the wood and inner bark, which they diſtinguiſhed by the name of Veins. They alſo deſcribed, very correctly, the Tracheæ, or air-veſſels, which take their courſe through the fibres of the wood.—Theſe anatomical preliminaries being ſettled, they proceeded to reaſon in this manner.——The root having abſorbed a quantity of juice from the earth, it is made to aſcend through the veſſels of the wood, by the alternate expanſion and contraction of the Tracheæ, aſſiſted by the natural abſorption of the ſap-veſſels themſelves. They ſuppoſed the ſap to be rarefied to the degree of a fine vapour, in which ſtate it mounted upward to the extreme parts of the plant, where, meeting with the external air, it became condenſed into a liquor, and in that form returned to the root by the venal ſyſtem, between the wood and bark. Dr. Hales, in the moſt ſatisfactory manner, ſet aſide this doctrine, and ſubſtituted another in its place, more conſonant to reaſon and experiment.——It is ſomething remarkable that Dr. Hervey ſhould have been the firſt who eſtabliſhed the *circulation* of the blood, in oppoſition to moſt of the anatomiſts in Europe; and that Dr. Hales ſhould have clearly diſproved the *circulation* of the ſap, contrary to the opinion of almoſt every naturaliſt of his time.——In order that we may have a diſtinct view of the motion of the ſap, it will be neceſſary to reflect, that the root, ſtem, branches, and leaves are conſtructed in the ſame manner. Sallows, Willows, Vines, and moſt Shrubs, will grow in an inverted ſtate, with their tops downward in the earth. Dr. Bradley deſcribes the manner of inverting a young Cherry-tree, the roots of which will put forth leaves, and the branches become roots. Hence it is obvious that the nutritive matter may be conveyed as well by the leaves as the roots, their vaſcular ſtructure being the very ſame.——We have now ſettled the anatomical ſtructure of a plant. Upon it de-

certainly the moſt natural and nurſing: As to the quantity, ſome plants require plentiful watering, others rather often, than all at once; all of them ſucking it in by the roots for the moſt part, which are their mouths, and carrying it thence thro' all the canals, organs, and members of the whole vegetable body, digeſted and qualified ſo as to maintain and ſupply their

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pends much of what we know of the vegetable œconomy. The motion of the ſap comes next to be examined.

During the heat of a ſummer's day, all plants perſpire freely from the pores of their leaves and bark. At that time the juices are highly rarefied. The diameters of the Tracheæ, or air-veſſels, are enlarged, ſo as to preſs upon and ſtraiten the veſſels that carry the ſap. In conſequence of which their juices, not being able to eſcape by the roots, are preſſed upward, where there is the leaſt reſiſtance, and perſpire off the excrementitious parts by the leaves and top-branches, in the form of vapour. When the ſolar heat declines, the Tracheæ are contracted; the ſap-veſſels are enlarged, and the ſap ſinks down in the manner of the ſpirits of a thermometer. In conſequence of this change, the capillary veſſels of the leaves and top-branches become empty. Being ſurrounded with the humid vapours of the evening, they fill themſelves from the known laws of attraction, and ſend down the new-acquired juices to be mixed with thoſe that are more elaborated.—As ſoon as the ſun has altered the temperature of the air, the Tracheæ become again diſtended, and the ſap-veſſels are ſtraitened. The ſame cauſe always produces the ſame effect; and this alternate aſcent and deſcent, through the ſame ſyſtem of veſſels, continues as long as the plant ſurvives.—The irregular motion of the ſtem and branches, is another cauſe that contributes to the aſcent of the ſap. Every time that theſe parts are acted upon by the air, they are made to aſſume a variety of angles, whereby the ſap-veſſels are ſuddenly ſtraitened. The contained juices conſequently receive reiterated impulſes, ſimilar to what happens to the blood of animals from the contraction of the heart. This obſervation may aſſiſt us in inveſtigating the vegetable œconomy, ſo far as it regards the management of fruit-trees, and probably may be extended throughout the whole ſyſtem of gardening, planting, and farming.—It may be objected, that trees fixed to the wall do, notwithſtanding, carry their ſap to the extreme branches; but it ſhould be conſidered that the warmth of their ſituation, aſſiſted by the horizontal direction of their branches, is fully ſufficient to propel the ſap, without the undulatory motion that I have mentioned.

I beg leave to remark, that theſe obſervations are only intended to convey a general idea of the motion of the ſap. It varies according to the temperature of the weather. The air is ſeldom one moment alike. The ſap muſt therefore ſometimes move quick, ſometimes ſlow. It may riſe and fall many times in a day. Sudden heats puſh it upward, ſudden colds make it fall. Thus the juices are blended, and the ſecretions forwarded.—The manner that the nutritive juices of the earth and atmoſphere are conveyed into the ſap-veſſels, remains to be deſcribed. And this makes a neceſſary part of our preſent argument, as it may aſſiſt us in finding out, and explaining, the diſeaſes

BOOK II. beings and growth, for the producing of whatever they afford for the uſe of man, and other living creatures.

Fifthly, The bark-bound are to be releaſed by drawing your knife rind-deep from the root, as far as you can conveniently, drawing your knife

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of plants from the variations of the weather.—The outer bark which covers every external part of a vegetable, as well below as above the ſurface, is full of perſpiratory or abſorbent holes. The veſſels of this bark being endowed with the power inherent in capillary tubes, draw up the moiſture that is applied to their ſurface. From them it is committed to the veſſels of the inner bark. After receiving ſome degree of melioration, the ſap is delivered to the blea. From the blea, it paiſes, by anaſtomoſing canals, to the vaſcular ſeries. From thence to the wood, or fleſh, where it receives its laſt concoction.—The nutritive particles, being ſeparated by the mechaniſm of theſe numerous canals, are applied towards the fructification and increaſe of the plant; while the watery and excrementitious parts are carried expeditiouſly to the leaves, where they are perſpired off in the form of vapour. It is evident, however, that, as water contains but few particles that are fit for nouriſhment, it was neceſſary that plants ſhould have the power of imbibing a large portion of that fluid. For which reaſon the Sun-flower, conſidered bulk for bulk, takes in ſeventeen times more nouriſhment than a man, and conſequently perſpires more.—During the continuance of dry north-eaſt winds, the leaves of corn are obſerved to grow yellow, and the early-ſet fruit frequently falls off. This is owing to the want of moiſture in the atmoſphere to fill the veſſels of the leaves and top-branches, whereby the fruit is deprived of nouriſhment. Under ſuch circumſtances, it is probable that wall-fruit may be preſerved by prudently watering the leaves and top-branches during the heat of the day. It is, however, a ſingular happineſs that the air is at no time perfectly free from moiſture. Bring a bottle of cold water into the warmeſt room, and its ſurface will immediately be covered with a thick dew. An air abſolutely dry, would in a few days annihilate the vegetable creation.—The air is juſtly ſaid to contain the life of vegetables, as well as animals. It is a compreſſible and elaſtic fluid, ſurrounding the face of the globe, and reaching to a conſiderable height above it. Vegetables do not grow in vacuo, and animals die when deprived of air. It has two ſtates, being either elaſtic or fixed. Dr. Hales obſerves, that, in its elaſtic and active ſtate, it conduces to the invigorating the juices of vegetables; and, in its fixed and inert ſtate, gives union, weight, and firmneſs to all natural bodies. By his experiments we are informed, that fixed air conſtitutes near one third part of the ſolid contents of the heart of Oak. It is found to bear the ſame proportion in Peaſe, Beans, and other vegetable ſubſtances. Heat and fermentation render it elaſtic. It is again capable of being abſorbed and fixed. Was the whole air of the univerſe brought at once into an elaſtic and repulſive ſtate, every thing would ſuffer a ſudden diſſolution. Was it entirely fixed, then all things would be reduced to an inert lump. Almighty Providence has provided againſt theſe extremes,

from the top downwards half way, and at a ſmall diſtance from the bottom upwards, the other half; this, in more places, as the bulk of ſtem requires; and if crooked, cut deep and frequent in the ham; if the gaping be much, fill the rift with a little cow-dung. Do this on each ſide, and at ſpring, February or March: Alſo cutting off ſome branches is profitable, eſpecially ſuch as are blaſted, or lightning-ſtruck: CH. VIII.

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and in the moſt wonderful manner preſerves the balance.—Air is to be found in every portion of earth; and as it always contains a ſolution of the volatile parts of animal and vegetable ſubſtances, we ſhould be careful to keep our ſtiff ſoils as open as poſſible to its influence. It paſſes, both in its active and fixed ſtate, into the abſorbent veſſels of the root, and, mixing with the juices of the plant, circulates through every part. Dr. Hales, in his ſtatical experiments upon the Vine, diſcovered it aſcending with the ſap in the bleeding ſeaſon.

Having demonſtrated that the motion of the ſap depends upon the influence of the air, and the power of abſorption common to all capillary tubes, it naturally follows, that it cannot remain one moment at reſt. The gradations from heat to cold, and *vice verſa*, are infinite, and ſometime deſultory. So muſt the motion of the ſap. From the combinations of the nutritive particles, a number of different fluids are prepared in the ſame plant. Matter is the ſame in all; but the modification of it makes things ſweet or ſour, acrid or mild.—The univerſal juice of a plant is a limpid ſubacid liquor, which flows plentifully from a wound made in a tree when the ſap is riſing. The Birch and the Vine yield it in great abundance. This liquor, as it moves thro' the innumerable ſmall veſſels, becomes more and more concocted, and is the general maſs from which all the juices are derived. It may be called the blood of the plant. By a certain modification it produces high-flavoured oils, gums, honey, wax, turpentine, roſin, and even the conſtituent parts of the plant itſelf. How this tranſmutation is performed, remains, and perhaps ever will remain, unknown.

I hope it will not be objected to me, that in this examination I have been too minute. In the hiſtory of nature we cannot be too particular. Every part of it demands our moſt ſerious attention, and every part of it repays us for the labour we beſtow. The wings of the butterfly are painted by the ſame Almighty hand that made the ſun. The meaneſt vegetable, and the moſt finiſhed animal, are equally the care of Providence. We conſtantly view the wiſdom of God in his works; and yet, as the wiſe man obſerves, "hardly do we gueſs aright at the things that are upon the earth, and "with labour do we find the things that are before us."

3. GENERATION. It is well known that the antients ſuppoſed two ſorts of generation, to wit, equivocal and univocal. This latter, they ſaid, took place when any thing was produced from its proper egg or matrix; the equivocal, when any living thing was generated fortuitouſly or by chance, from the confuſed mixture of particles. Thus, *e. g.* they believed that fleas were generated from urine and ſaw-duſt; that myriads of

Book II. If, as ſometimes, it proceed from the baking of the earth about the ſtem, lighten and ſtir it.

Sixthly, The Teredo, Coſſi, and other worms, lying between the body and the bark (which they ſeparate) poiſon that paſſage to the great prejudice of ſome trees; but the holes once found, they are to be taken out with a

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little inſects like atoms came up out of ſlimy water, and maggots out of cheeſe in the ſummer; that ſeveral ſorts of herbs quickly ſprang up out of mould taken from a conſiderable depth below ground; and, laſtly, that worms were produced from putrid carcaſes. Others thought that the Creator, at the beginning, mixed ſeeds and eggs with the earth every where; ſo that when ſuch earth was dug up, and the ſun, by his heat, had hatched the ſeeds, they imagined that herbs, plants, and animals ſprung up, which were concealed therein from the creation. But all the ingenious men of this age, who have imbibed the ſound principles of natural philoſophy and natural hiſtory, have long ago rejected this ridiculous opinion. God at the firſt gave to every living thing its own proper ſeed, and to each a tendency or propenſity to propagate its ſpecies; and eſtabliſhed this firſt and great law to remain unalterable, "Increaſe and multiply." If from putrefaction, and the heat of the ſun, living creatures and plants could be produced, it would have been needleſs, and conſequently highly unworthy of the Supreme Being, to have created ſo many and ſo amazingly curious veſſels for the preparation of the ſeed; for in that caſe putrefaction would be equivalent to creation. And if very minute inſects and other animals could be produced from putrefaction, and hatched by the heat of the ſun, why might not horſes, elephants, and other large animals, be produced in the ſame way? For in large bodies the mechaniſm is eaſier, as the matter is more manageable; but in ſuch minute inſects, and, as we may ſay, ſuch nothings, what wiſdom, what power, what inexplicable perfection is diſplayed, ſince nature is never more compleat than in her moſt minute works! He muſt be void of underſtanding who does not perceive the abſurdity of equivocal generation, when he ſees a body made with ſuch wonderful art, and adorned with ſo many thouſand pipes and canals, that no mechanic, even the moſt perfect of mortals, can find out all the contrivance, much leſs imitate this wonderful fabric; yet can, as it were by a wilful miſtake, ſay, that he believes all thoſe things were made by a fortuitous and confuſed concourſe of atoms. For it would follow from hence, that new ſpecies both of animals and plants would always occur, neither of which we obſerve, or have any account of. In this caſe too, there could be no arguing from the genera to the ſpecies. In a word, there would be no ſuch thing as certainty, but all confuſion. Redi, having a mind to examine equivocal generation, put recent fleſh into a glaſs veſſel, covered with a very thin linen cloth, and expoſed it to the ſun; after a little time, he found that flies laid their eggs upon the linen cloth; but no maggots were produced in the fleſh. We muſt not conclude that inſects are produced by equivocal generation, becauſe we ſee many thouſands of them about pools and ditches, where the putrefying filth of thoſe places furniſhes

ſight inciſion, and the wound covered with loam. Or, let the dry part of the wood, bark and all, be cut, applying only a waſh of piſs and vinegar twice or thrice a week during a month: The beſt means to find out their quarters, is to follow the Wood-pecker and other birds; theſe pitching upon the ſtem, as you may obſerve them, and knocking with their bills, give notice that the tree is infected, at leaſt between the bark. But there

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plentiful nouriſhment for them, which is the reaſon that their eggs are rather depoſited there, and are more eaſily hatched, and thrive better, as lice abound more on the ſcald heads of children, becauſe of their plentiful nouriſhment. The *Stapelia Hirtuſa* produces a flower that ſtinks like carrion, for which reaſon the fleſh-flies, deceived by the ſmell, fill the whole flower full of their eggs, taking it for putrid fleſh. We have no reaſon to believe, what ſome have aſſerted, that wheat degenerates into barley, and barley into oats, and oats into brome-graſs; for every ſpecies produceth its own like; nor was it ever known that the fierce eagle produced the timorous dove. Having confuted equivocal generation, it will follow that every living thing is produced by univocal generation, or from an egg. Now vegetables, we have already proved, are endued with life, therefore they alſo proceed from eggs. And indeed the great Harvey long ago maintained this doctrine, that every living thing derives its origin from an egg. But ſome of the moderns have ſtrenuouſly endeavoured to overthrow this opinion, their cauſe being chiefly ſupported by ſuch arguments as the following: If, ſay they, we take a part from the root, and ſet it in the ground, it ſtrikes root, and a new plant ſprings up; again, if a polypus is cut into ſeveral parts, from each of theſe parts an entire and compleat polypus is formed, according to the late diſcoveries of Trumbull and others. But do we not as frequently ſee that a plant produces from the ſame root ſeveral ſhoots or ſtems? For a ſtem is nothing but a root above ground; for which reaſon, if we turn a tree, *e. g.* the Lime tree, upſide down, the ſtem will become the root, and the root be changed into branches, which we may reckon among the late diſcoveries in gardening. Beſides, what we have ſaid is farther confirmed by the branches, all of which ſpring from the ſtem or root; but the ſtem or root from whence this branch or ſhoot was taken, roſe from a ſeed or egg. The ſame thing may be ſaid of the polypus among animals; and therefore a polypus lives a vegetable life, or a vegetable lives the life of a polypus: and this manner of propagation, tho' very rare in the animal creation, is extremely common in the vegetable kingdom. No one ought to wonder that new leaves are produced every year from the root or branches; for in the ſame manner do we daily ſee the feathers of birds produced. A feather, which is a moſt curious piece of workmanſhip, conſiſts of a concave baſe, filled with a veſſel like a lymphatic, ſo that the aliment can paſs upward but not downward; next there is the midrib, and the lateral branches both partial and proper, ſo that a feather may be compared to a fern twice compounded. Now daily experience informs us that feathers, though adorned with ſuch curious mechaniſm, fall off every year, and that others, ſpringing from the body of the bird, ſucceed in their room. Moreover, it is

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are divers kinds of theſe ξυλόφαγοι, of which the τερηδὼν, or tarmes, already mentioned, will ſometimes make ſuch a noiſe in a tree, as to awaken a ſleeping man: The more rugous are the Coſſi, of old had *in Deliciis* amongſt the Epicures, who uſed to fatten them in flour; and this (as Tertullian and S. Hierom tell us) was the chief food of the Hierophantæ Cereris, as they are this day a great regalo in Japan: In the mean time, experience

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evident that feathers grow only out of the body of the bird, that this body is their root, and that this root owes its origin at firſt to a ſeed or egg. The ſame alſo holds in plants: therefore polypi, and plants of every kind, have undoubtedly ſeeds or eggs, by which they are multiplied, without being cut or propagated by ſhoots, layers, branches, or ſuckers. Add to this, that the famous Bern. Juſſieu diſcovered eggs or ſeeds in the polypi, as may be ſeen in the Tranſactions of the Stockholm Society for the year 1746.

Here we are to obſerve, that all viviparous animals have their eggs, out of which comes their offspring, though theſe eggs are contained in their proper matrix, and excluded in due time, in the ſame manner as an egg in the neſt cheriſhed by the incubation of the bird, whoſe uterus is the neſt. Nor can we deny, but the ſmalleſt vegetables have ſeeds, although often not diſcoverable by the naked eye. Valiſnerius has diſcovered the ſeeds in Ducks-meat, and Michelius has done the ſame in the Mucor and Byſſus; Bobart in the Ferns; Linnæus in the Moſſes; and Reaumur in the Fungi. The antients thought that miſleto was produced without ſeed, having ſeen it often grow from the underſide of branches; for how the ſeeds of the miſleto could be conveyed from one tree to another, and there adhere to the underſide of the branches, was very difficult for them to conceive. But time has diſcovered, that the Thruſh, ſwallowing the berries on account of the pulp, afterwards voids the ſeeds entire, which ſtick with the excrements to the branches. Theſe viſcous ſeeds are waſhed by the rains, ſo that ſome of them are often protruded to the lower ſide of the branches, where they grow.

Some people are perſuaded, that the ſeſſile and flat funguſes on trees are morbid excreſcences; but it is plain they are true ſpecies of thoſe agarics which are furniſhed with caps and ſtems, and grow on the ground, whoſe ſeeds falling on a moiſt tree, produce, as it were, half caps without ſtems. That ſeeds are the eggs of plants appears from hence, that as every egg produces an offspring ſimilar to the parent, ſo alſo do the ſeeds of vegetables, and conſequently they alſo are eggs. The containing parts of a hen's egg are, the ſhell, the external film or membrane, the internal membrane lying immediately under the former, the chalazæ, or membrane incloſing the yolk, twiſted at the extremities. The parts contained are, the air within the external membrane at the obtuſe end of the egg, the thinner and exterior part of the white, the interior and thicker part of the white, the yolk, the hilum, ſcar or cicatrice, in the center of which is the ſpeck of life. When an egg is ſet under the hen, after two days incubation, the ſpeck of life becomes red, ſends out its blood-veſſels through the yolk, and at laſt

has taught us, that millipedes, (plentifully found under old timber-logs) being dried and reduced to powder, and taken in drink, are an admirable ſpecifick againſt the jaundice, ſcorbut, &c. to purify the blood, and clarify the ſight.

There is a peſtilent green worm which hides itſelf in the earth, and gets into pots and caſes, eating our ſeedlings, and gnawing the very roots, which

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we find the whole chick is formed out of the ſpeck of life; the yolk becomes the ſecundines; the white, that fluid which nouriſhes the chick in the egg, or liquor of the amnion, and the two membranes, become the amnion and chorion. A ſeed has alſo a ſhell, external membrane or film, a membrane including the yolk, the yolk itſelf, and the ſcar or point of life. In ſeeds the white is wanting, there being no uſe for it, as the moiſture of the earth ſupplies its place, and nouriſhes the embryo of the plant. Likewiſe the eggs of fiſhes have no white, becauſe they are always in the water. When the flower is going off, the ſeed begins to ſwell, and on its outſide there is ſeen a veſicle, which is the amnion of Malpighi, furniſhed with an umbilical cord or navel-ſtring, which is produced thro' the chorion to the oppoſite ſide of the egg. While with the egg the amnion increaſeth, on its top is obſerved another ſmall body, which likewiſe increaſeth continually, till it has filled the whole chorion and egg; and the amnion and chorion are turned into the external ſhell or coat of the ſeed. See Logan's Exper. 9, by which it appears that the ſame changes are brought about in the ſeed as in the egg; and therefore, that the ſeeds are the eggs of plants cannot be doubted. That plants ſpring from the yolk of the egg is farther confirmed by the lobes, which, when we ſpeak of cows and other ſimilar quadrupeds, are nothing elſe than ſeveral ſecundines, always adhering to the fœtus, drawing their ſupply of fluids from the matrix, which fluids they prepare for the nouriſhment of the tender fœtus. That moſt plants have ſeminal leaves or lobes is very well known. Now theſe ſeminal leaves once conſtituted the whole ſeed, except the hilum, or little heart, in which is the point of life; and theſe lobes prepare the nouriſhment for the very tender plant, until it be able to ſtrike root in the earth; in the ſame manner as the yolk in an egg, becoming the placenta, prepares the nouriſhment, and ſends it by the navel-ſtring to the chick; after which they drop off. Hence it appears, that the ſeminal leaves are the lobes: But ſince all lobes come from the egg or ſeed, we may fairly conclude that plants are produced from eggs.

From what has been ſaid, it appears that all vegetables have eggs from which they are produced. Now daily experience teaches us, that no egg can produce an animal, till it be impregnated or fecundated by the male: A hen indeed will lay eggs, but not ſuch as will produce a chicken, unleſs they are impregnated or fertilized by the cock or male. That all generation precedes the birth, appears throughout univerſal nature. In quadrupeds it does without doubt: but as to fiſhes, there is a vulgar notion that their generation follows or comes after the birth or excluſion of their eggs, and that

BOOK II. ſhould be ſearched out. And now we mention roots; over-grown toads will ſometimes neſtle at the roots of trees, when they make a cavern, which they infect with a poiſonous effluvium or vapour, of which the leaves famiſhed and flagging give notice, and the enemy dug out with the ſpade. But this chiefly concerns the gardeners mural fruit-trees; tho' I queſtion not but that even our foreſt-trees ſuffer by ſuch pernicious vapours, rats, and other ſtinking vermin, making their neſts within them. But for all theſe

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the male ſperm is emitted upon the eggs after they are excluded from the matrix of the female. But this opinion will ſoon be laid aſide, when it is now made to appear by modern obſervations, that the male fiſh emits his ſperm a day or two before; that the female, which follows him, greedily devours the ſame, and thus conceives by the mouth before the excluſion of the eggs. Amphibious animals have their proper laws; for they copulate as all other animals, but with this difference, that the male ſerpents, in like manner as the crab, have two penes, and the rattle-ſnake four rough echinated penes. The generation of frogs is ſtill very obſcure; and is likely to be ſo, till Reaumur ſhall favour the public with his later obſervations, which is much to be wiſhed for. In the mean time however, there is no doubt to be made, but that the excluſion of their eggs follows after their copulation. There have been many different opinions of the phyſiologiſts, how, or in what manner, generation was brought about, or rather the fecundation, but this remains as great a myſtery as ever. The effervеſcences, precipitations, and other ridiculous notions of the antients, are now juſtly laid aſide: but Phyſicians have hitherto acquieſced chiefly in two opinions; the firſt was, that of the great Harvey, to wit, that in the ſpeck of life, or cicatrice, the entire rudiments of the future fœtus were preſent, perfect in all its members, and that it was only requiſite that the male ſperm ſhould add or excite the firſt ſpirit, motion, and life. His followers alſo contend, that ſo curious and wonderful a machine as an animal body is, could never be formed and perfected by another machine. And that therefore in the ovarium of the firſt female there muſt needs be her offspring or ova, and in them others, and ſo on in an infinite ſeries through all the ſubſequent deſcending generations. In a word, that in the ovarium, or loins, of Eve, the whole race of mankind were contained, whether paſt, preſent, or future. Now allowing that matter were infinitely diviſible, yet it exceeds all belief, that ſo many myriads ſhould be contained in one egg. The ſecond hypotheſis, or ſuppoſition, how generation, or the fecundation of the egg, was brought about, was that of Leuwenhoek, that the cicatrice of the egg was empty, and the male ſperm replete with myriads of animalcules, which being admitted into the ovarium of the female, ſome of them entered the empty ovula contained therein, increaſed, and at laſt became a compleat fœtus. Thus his followers eſtabliſhed their opinion on fancies inſtead of rational experiments. Gordon argued, that the cicatrice was hollow, and that one animalcule of the male ſperm filled it, and by a wonderful metamorphoſis was transformed into a compleat animal. Dalempatius maintained, that theſe animalcules were compleat, and wrapped up in a thin involucrum.

let our induſtrious planter (eſpecially the learned favourers of the moſt refined parts of horticulture) conſult the Diſcourſes and Experiments of Sig. Fran. Redi, Malpighius, Leuwenhoek, Swammerdam, &c. with our own learned Doctors, Lyſter, Sloane, Hook, (and other ſagacious Naturaliſts) to ſhew, that none of theſe diſeaſes and infirmities in plants proceed from any pure accidental, but real cauſe; as flatus, venemous liquor, and infections. Some, even of the minuteſt animals, are provided with inſtru-

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Andry fancied imaginary valves and perforations in the ovula. Liſter maintained, that thoſe animalcules ſerved only to excite venery. Valiſnerius, that the male ſperm was by them only kept in motion. Many of the moderns have adopted this laſt opinion. For the carina, or keel-ſhaped appearance, which Malpighi obſerved as the firſt rudiments of the fœtus that appeared in the egg after incubation, was very like thoſe animalcules; but they have all erred in this affair. For, in the firſt place, thoſe corpuſcles which Leuwenhoek diſcovered in the male ſperm, are by no means animalcules having proper and voluntary motion, but mere inert particles diffuſed through the male ſperm, like ſo many oily particles ſwimming in a fluid, as clearly obſerved by means of good microſcopes. 2. If they were really animalcules, according to Leuwenhoek's opinion, to be metamorphoſed in the ovula, they muſt neceſſarily have their own two tunics; and, by caſting thoſe tunics ſucceſſively one after another, they muſt be changed, firſt, from the ſtate of a larva, or grub, into the ſtate of a pupa, nympha, chryſalis, or aurelia, and next into a compleat animal; but the amnion and chorion of the fœtus derive their origin from the egg, and not from thoſe animalcules, as they are called. 3. That the Author of Nature always acts in the moſt compendious way, I think no one will readily deny; ſo, on the other hand, neither will any one believe that the ſame All-wiſe Creator formed ſo many myriads of animalcules for the ſake of one only. 4. How this hypotheſis will account for generation, I cannot ſee; for, ſuppoſing that thoſe corpuſcles were really animalcules, then they alſo would have their animalcules by which they were produced, and theſe laſt others, and ſo on without end, which is the greateſt abſurdity. 5. The ſecundines are from the yolk, and it is well known, that the yolk is found in an egg not fecundated; if, therefore, we ſhould aſcribe the rudiments of the fœtus to the male ſperm, then the umbilical cord, with its membranes, would be totally diſtinct from the yolk, and by that means not have the ſame common tunic with the yolk, which we know to be falſe. How then generation, or the fecundation of the ovula, is effected, we are wholly ignorant.

When a horſe copulates with a ſhe aſs, the ſpecies produced, which we call Hybrid, mongrel or mule, is neither like the male nor female; which would certainly be the caſe, were the rudiments of the fœtus to derive their origin wholly from one ſex only.

That we may make a full enquiry into this ſubject of the generation of plants, it will be proper to inveſtigate the ſituation of their genital organs. Now we have proved that the ſeeds are the eggs of plants, and from the laſt ſection it appears that

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ments to pierce the very ſolid ſubſtances of trees and plants, and infuſe their peſtiferous taint; where likewiſe they leave their eggs, boring thoſe neſtling places with certain terebræ, where we find thoſe innumerable perforations which we call worm-eaten; the wider latebræ are made by erucæ, caterpillers, ants, and bigger inſects, raiſing morbid tumors and excreſcences, and preying upon the fruit as well as on the leaves, buds, and flowers, ſo ſoon as their eggs are hatched, when they creep out of their

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whereſoever the fecundated eggs are, there we are to ſeek for the organs of generation; and we ſhall find the genital organs of plants where the ſeeds are produced. But the ſeeds are produced where the flower and fruit are; therefore the flower and fruit are the genital organs of plants. Some have aſſerted that certain vegetables wanted flowers, and others both flowers and fruit. Tournefort maintained that the Algæ, or Flags, and Moſſes, had ſeeds, but no flower; and that the Fungi, and ſome others, had neither flowers nor fruit. Hence ſome of the moderns have argued againſt the fructification. But for one to deny flowers and fruit even to the moſt minute vegetables, which he finds in all the larger ſpecies that can fall under his inſpection, is not the part of a fair and rational enquirer. For it is the ſame as if we ſhould conclude concerning ſome minute ſpecies of inſects, that they had neither feet, nor eyes, nor mouth, nor genitals, becauſe we cannot diſcover them with the naked eye. Bobart ſowed the ſeeds of Ferns, which grew very well. Plumier diſcovered the flowers in ſome of the Fern kind, and the ſame may be eaſily inveſtigated in the *Trichomanes* of Linnæus. Linnæus diſcovered the ſeeds of Moſſes, and in the *Polytrichum* we have pretty clear ſigns of both ſexes. In the *Lycopodium Selaginoides*, or Prickly Club-moſs, Linnæus obſerved, that one part of the fructification contained the fertilizing duſt, and the other the ſeeds, which were evident ſigns that the plant had both flower and fruit. B. Juſſieu traced the flowers of the *Pilularia* or Pepper-graſs. Reaumur diſcovered the fructification in the *Fuci*. Linnæus numbered the *ſtamina* and *piſtilla* in the *Jungermannia Epiphylla*, or Broad-leaved *Jungermannia*. Valiſnerius has delineated in the *Lemna*, or Ducks-meat, the *calyx*, the *ſtamina*, the *piſtillum*, the *capſula*, and the ſeeds. Michelius has frequently numbered the *ſtamina* of the *Fungi*, and has ſown their ſeeds, which grew very well. Nov. Gen. Tab. 68, 73, and 74. Hence therefore we may conclude, that theſe loweſt tribes of vegetables are all furniſhed with flowers and fruit, although by reaſon of their exceeding minuteneſs they have not hitherto been diſtinctly known to botaniſts. In ſhort, there never was a clear and evident example produced of any plant which wanted flowers and fruit; and therefore we may juſtly ſay, that in their fructification conſiſts the eſſence of plants.

Univerſal experience atteſts, that the flower always precedes or goes before the fruit, in the ſame manner as generation precedes the birth in animals; ſo that not one example of the contrary can be produced in any individual. The *Colchicum Autumnale*, or Meadow-ſaffron, flowers in the autumn, but the fruit, with the ſtem and leaves, appears the following ſummer in the months of May and June. The Haſel puts forth its

little caverns in armies, like the Egyptian locuſts, invading all that's green, and tender rudiments firſt, and then attacking the tougher and ſolider parts of vegetables. To thoſe learned perſons above, we may not forget the late worthy and pious Mr. Ray, where, in the Second Part of his Treatiſe of the Wiſdom of God in the Creation, we have a brief, but ingenious account of what concerns this ſubject, together with what is added about ſpontaneous productions of theſe deſpicable little animals, to which I refer the curious.

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flowers early in the ſpring, but ripens its fruit or nuts in Auguſt. In a word, the flowers always come before the fruit in every plant, without exception.

Since in animals all generation precedes the birth, and in vegetables every flower precedes the fruit, we muſt neceſſarily aſcribe fecundation to the flower, and the birth or excluſion of the ſeed to the ripe fruit.

Hence we may define a flower to be the genital organs of a plant ſerving for fecundation, and the fruit to be the genital organs ſerving for the birth or maturation of the ſeed. There has been much diſpute among botaniſts concerning the definition of a flower; many have aſſerted that the eſſence of a flower conſiſted in the corolla or petals: this opinion Knautius embraced, and alſo denied that there ever were any flowers deſtitute of petals. But experience and our ſenſes tell us, that there are many plants, ſome of which want the calyx, as the Tulip, Fritillary, &c. others the corolla, as the Graſſes, Cats-tail, Bur-reed, and Pine; others the ſilaments of the ſtamina, as the Birthwort; others the ſtyle, as the Graſs of Parnaſſus, &c. but that all flowers whatever, except the Moſſes only, are furniſhed with the antheræ or ſtigmata, or both together; and as this holds univerſally in every ſpecies of plant, (the Moſſes only excepted) theſe parts muſt neceſſarily conſtitute the eſſence of a flower. If we find a flower with antheræ, but no ſtigmata, we may alſo aſſuredly find another flower either in the ſame, or a different plant of the ſame ſpecies, which has ſtigmata with the antheræ, or without them. Pontedera, on the authority of the Hortus Malabaricus, contends, that there are ſome plants which have no antheræ; *e. g.* the *Cycas Circinalis*, or Sagoe Palm tree, the *Celtis*, or Nettle tree, with ſome others: But in this he is miſtaken, for even the number of the antheræ in thoſe plants he mentions is at preſent very well known to botaniſts. The ſame objection has been made in regard to the *Iſoetes*, or Quillwort; but Linnæus diſcovered the antheræ of this plant; It. Scan.— Hence we perceive the error of the followers of Rivinus, who took the nectaria in the Hellebore, Nigella, and Paſſion flower, for flowers; which nectaria have properly no piſtilla nor antheræ. For the act of fecundation two things are requiſite, namely, the genital organs of both ſexes; becauſe, as was ſaid above, one of the ſexes alone cannot propagate the ſpecies. Now the act of fecundation is performed in the flower, therefore it follows, that the genital organs of both ſexes muſt be preſent in the flower. We are here however to obſerve, that the genital organs of both ſexes are not always preſent in one and the ſame flower. It is ſufficient that the genital organs of the male be in one flower, and thoſe of the female in another. Since every plant bears ſeeds

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Trees, eſpecially fruit-bearers, are infeſted with the meaſles, by being burned and ſcorched with the ſun in great droughts; to this commonly ſucceeds louſineſs, which is cured by boring a hole into the principal root, and pouring in a quantity of brandy, ſtopping the orifice up with a pin of the ſame wood.

Crooked trees are reformed by taking off or topping the preponderers whilſt charged with leaves, or woody and hanging counterpoiſes.

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by which its offspring can be propagated, and no egg can be hatched before fecundation, it will follow, that fecundation is as neceſſary as the ſeeds themſelves. Hence it appears, that the genital organs of both ſexes, which ſerve for fecundation, are altogether neceſſary, if the flower is perfect, and that they are the eſſential parts. But we find no parts of a flower that are eſſential but the antheræ and ſtigmata, therefore theſe parts are the genital organs of both ſexes, ſerving for fecundation.

The male organs of generation in animals are very different. Some have a penis, as the quadrupeds, birds and ſerpents, ſome of the fiſhes, inſects, and worms; others have no penis, as many of the true fiſhes, and thoſe called ſhell-fiſh. Some have ſeminal veſicles, as the greateſt part of quadrupeds; others have none, as the dog kind. Some have teſticles diſtinct from the ſeminal veſicles, as the quadrupeds; and others have both teſticles and ſeminal veſicles united in one, as the fiſhes. Now we maintain that the antheræ, the male organs of generation in flowers, are nothing elſe but the bodies which prepare and contain the male ſperm; therefore theſe antheræ are the teſticles together with the ſeminal veſicles, and their duſt the genuine male ſperm of plants, anſwering to thoſe particles which are called animalcules in the male ſperm of animals. The truth of this we ſhall prove by the following arguments. 1. *Preceding the fruit.*—The antheræ and their duſt always come before the fruit. When the fruit ſheds its ſeeds, it is come to maturation. This is the caſe with the antheræ; for when they ſhed their duſt, they are come to maturation, and have done their office; yet their duſt is always ſhed when the flower is in full vigour, and then the antheræ drop, and are uſeleſs. 2. *Situation.*—The antheræ are always ſo ſituated in the flower, that their duſt, which is the male ſperm, may reach the piſtillum or female organ; for the ſtamina either ſurround the piſtillum, as in moſt flowers; or, if the piſtillum incline to the upper ſide of the flower, the ſtamina do the ſame, as in the Didynamia; or, if the piſtillum nods, the ſtamina aſcend, as in the Caſſias, and the common Winter-green. Several plants in the Monæcia Claſs have the male flowers over the female, as Indian Corn, Palma Chriſti. 3. *Time.*—The antheræ and ſtigmata are in full vigour at the ſelf-ſame time, and this not only when both are in one and the ſame flower, but alſo when they are in diſtinct or ſeparate flowers; ſo that the long catkins of the Haſel, Birch, Alder, never diſcharge the duſt of their antheræ before the ſtigmata below them are come out. The male Hemp never ſheds its duſt before the piſtilla of the female plants appear. 4. *Cells.*—Tournefort was of opinion that the antheræ did the office of kidneys, purging the ſeveral parts of the plant from all ſuch particles as were not fit for its nouriſh-

Excorticated and bark-bared trees may be preſerved by nouriſhing up a ſhoot from the foot, or below the ſtripped place, and inſerting it into a ſlit above the wounded part; to be done in the ſpring, and ſecured from air, as you treat a graff: This I have out of the very induſtrious Mr. Cook, p. 48. But Dr. Merret brought us in this relation to the Royal Society, that making a ſquare ſection of the rinds of Aſh and Sycamore, (March 1664) whereof three ſides were cut, and one not, the ſucceſs was,

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ment, by receiving them into their cells, and that their valves were burſt open by thoſe accumulated excrements. Pontedera's opinion was, that the antheræ are nothing elſe but a cluſter of cells, which receive a peculiar juice or fluid, and then tranſmit it thro' the filaments to the receptacle, from whence it is carried to the embryos of the ſeed; but the falſehood of this opinion will appear from the conſideration of all the plants of the Diæcia claſs, the figure of the pollen, artificial fecundation, caprification, and the culture of Palm trees. If we cut aſunder the antheræ before they ſhed their duſt, we find their ſtructure altogether as wonderful and curious as the ſeed-veſſels themſelves. For within they conſiſt either of one cell, as the Mercury; or two, as Hellebore; or three, as the Orchis; or four, as the Fritillary; and they open or ſplit either longitudinally, as the Leucoium, or greater Snow-drop; or at the baſe, ſeparating into pieces or valves, as the Barren-wort; or from the top, as the common Snow-drop; or at the two points or horns, as the Whortle, Heath, Winter-green, and Marſh-roſemary. 5. *Caſtration.*—If we cut off the antheræ of any plant which bears but one flower, taking care at the ſame time that no other plant of the ſame ſpecies is near it, the fruit proves abortive, or at leaſt produces ſeeds which will not vegetate. This is a certain truth, which any one will find upon trial. 6. *Figure.*—The figure of the fertilizing duſt will clearly convince any one that this fine powder is not accumulated by chance, or from the dryneſs of the antheræ. Malpighi, Grew, Moreland, and Geofroy, who have all viewed the figure of theſe particles with good Microſcopes, found all the particles exactly equal to one another, but in different genera as great a difference in ſhape and figure, as the ſeeds themſelves ever have. As for example, in the Sunflower the particles are globular and echinated, or full of prickles; in the Bloody Cranesbill, they are like a perforated globule of fire; in the Mallows, they appear like wheels with teeth; in the Ricinus, or Palma Chriſti, they are ſhaped like a grain of wheat; in the Panſies, they are angulated; in the Turkey Wheat, flat and ſmooth; in the Borrage, like a thin leaf rolled up; in the Narciſſus, kidney-ſhaped; in the Comphrey, like double globules, &c. The powder of the antheræ, in point of fecundation, anſwers to Leuwenhoek's animalcules in the male ſperm; and the ſtigma, which receives this duſt, is always moiſtiſh, that the duſt may inſtantly adhere or ſtick to it. The obſervation of the famous botaniſt B. Juſſieu, concerning the Maple, deſerves our notice. "Thoſe Gentlemen (ſays he) who have examined the fertilizing duſt of the Maple by microſcopes, have drawn the particles in form of a croſs. But I found their form to be globular, and as ſoon as the particles touched any moiſture,

Book II. that the whole bark did unite, being bound with pack-thread, leaving only a ſcar: but being ſeparated intirely from the tree, namely ſeveral parts of the bark, and at various depths, leaving on ſome part of the bark, other cut to the very wood itſelf, being tied on as the former, a new rind ſucceeded in their place; but what was covered over beyond the places of inciſion with diachylon plaiſter, and alſo bound as the reſt, did, within the ſpace of three weeks, unite to the tree, though with ſome ſhrivelling and

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they burſt into four parts or valves, in the ſhape of a croſs." From which obſervation we may infer, that thoſe particles are hollow globules containing ſome ſubtle matter within, and that as ſoon as the hollow globules touch the moiſture, they burſt and diſcharge their exceeding fine contents. This laſt obſervation throws ſome light on the generation of animals, from its analogy to the ſeminal animalcules. Upon the whole it abundantly appears, that the antheræ are the male organs of generation, and their duſt the genuine male ſperm. Since in every flower the antheræ and ſtigmata are the genital organs ſerving for fecundation, and the antheræ the male organs, it is obvious to every one, that the ſtigmata, the other eſſential part of the flower, is the female organ of generation, which we ſhall more fully prove by the following arguments.

The parts of the piſtillum are three, the germen, the ſtyle, and the ſtigma. The germen, or ſeed-bud, while the plant is in flower, is always imperfect and immature, being only the rudiment of the future fœtus; the ſtyle is no eſſential part, for it is wanting in many ſpecies of plants; but the germen can never bring the fruit to maturity, except it be within the flower along with the ſtigma. Hence it follows, that the ſtigma is that part of the flower which receives the impregnating duſt. This will farther appear, 1. From the *Situation*.—For we are to conſider that the ſtigma is always ſo ſituated, that the antheræ, or their impregnating duſt, can reach it, as we have ſhewn above. Hence the ſyngeneſious plants are rarely barren. Moreover the ſtigma has always a figure proper and peculiar to itſelf, ſo that in moſt (tho' not all) plants it is double when the fruit conſiſts of two cells, as in the maſked and umbelliferous plants; triple, when the ſeed-veſſel has three cells, as in the Lilies; quadruple, when the ſeed-veſſel has four cells, as in the Graſs of Parnaſſus; there are five ſtigmata when the ſeed-veſſel has five cells, or five ſeeds, as in the Geranium, Winter-green, Wood-ſorrel; there are ſix ſtigmata when the ſeed-veſſel has ſix cells, as in the Aſarabacca; there are ten ſtigmata when the ſeed-veſſel has ten cells, as in the Pork-phyſick; there are many ſtigmata when the ſeed-veſſel has many cells, as may be ſeen in the Mallows, or in the Poppy, which is furniſhed with as many receptacles for the ſeed as there are ſtigmata. 2. *Time*.—The ſtigmata are always in full vigour at the ſame time with the antheræ. For in the Indian Wheat, as Logan obſerves, on the ſame day that the antheræ burſt their incloſure, and hang down in the open air, are ſeen the bundles and extremities of the ſtyles coming out of the ſheath of the ſpike to open view. 3. *Falling off*.—The ſtigmata in moſt plants, when they have diſcharged their office, drop off in the ſame manner as the antheræ do; which is a moſt evident ſign that the

ſcar: The ſame experiment tried about Michaelmas, and in the winter, came to nothing: Where ſome branches were decorticated quite round, without any union, a withering of the branch beyond the inciſion enſued; alſo a twigg ſeparated from a branch, with a ſloping cut, and faſtened to it again in the ſame poſture, bound and covered with the former plaiſter, withered in three days time. Among other eaſy remedies, a cerecloth of freſh butter and honey, applied whilſt the wound is green, eſpecially in

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ſtigmata contribute nothing to the ripening of the fruit, but ſerve only for the purpoſe of generation. 4. *Being cut off.*—If the ſtigmata be cut off before they have received the impregnating duſt of the antheræ, the plant is caſtrated as to the female organs, and the fruit periſhes: A ſufficient demonſtration that the ſtigma is that part of the female organ of generation deſtined for conception. The ſtigma of a flower has, beſides, two other ſingular properties; namely, that it is always diveſted of the cuticle or film, nor has it any bark as the other parts, and then it is always bedewed with a moiſture. Hence it appears, that the arguments of Pontedera have no force to invalidate our doctrine. For when he would oppoſe the doctrine of the generation of plants, the whole force of his argument is drawn from the umbelliferous plants, whoſe ſtyles are not come up when their ſtamina appear. But the ſtigma is that part which ſerves for the purpoſe of generation, and not the ſtyle, which may be wanting in many, as it is not an eſſential part of the flower. It is ſufficient, therefore, that the ſtigmata in the umbelliferous plants be in full vigour at the ſelf-ſame time with the antheræ, tho' the ſtyle be lengthened after conception, which is the caſe alſo in the Maple.

The generation then of plants is brought about by the antheræ ſhedding their duſt on the ſtigmata. It is not ſufficiently clear in what way the generation of animals is accompliſhed; but thus far we are certain, that the male ſperm muſt come in contact with the female organ, if there be any impregnation. In the vegetable kingdom the genital duſt is carried by the air to the moiſt ſtigmata, where the particles burſt and diſcharge their exceeding fine or ſubtle contents, which impregnate the ovary. That this is the caſe, will be ſhewn by the following arguments. 1. *Sight.*—When a plant is in flower, and the duſt of the antheræ flying about, that part of this duſt lights upon and clings to the ſtigma, is obvious to every beholder. The flower of the Panſies ſhews this in a moſt agreeable manner; for, when the flower is ſcarcely opened, you ſhall ſee the ſtigma, like a concave globe, gaping wide open on one ſide, and of a pure white colour; but, as ſoon as the five ſtamina have diſcharged their duſt, you may obſerve the whole ſtigma filled with this genital duſt, and covered all over with a yellow or browniſh colour, yet the tube of the piſtillum remains clear and tranſparent. Before this impregnation, if you gently ſqueeze the ſtigma, there oozes from it a certain ſweetiſh liquor, which retains and attracts the genital duſt. In the Hedge-hyſſop alſo the ſtigma gapes or opens to receive male duſt, upon which it ſhuts, and the ovary being thus impregnated ripens its ſeed. The Iris ſhews us a particular ſtructure; for the ſtigmata ſpreading wide, wholly cover the antheræ; yet they are ſo ſitu-

Book II. ſummer, and bound about with a thumb-rope of moiſt hay, and rubbed with cow-dung, has healed many: But for rare and more tender trees, after pruning, take purely refined tallow, mingled and well hardened with a little loamy earth and horſe-dung newly made.

Dr. Plot ſpeaks of an Elm growing near the bowling-green at Magdalen-College, quite round diſbarked, almoſt for a yard near the ground,

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ated in regard to the petals, that, by means of a gentle wind under the ſtigmata, the male duſt can mount by the channels of the petals. The *Campanula* differs from other flowers in this, that the male duſt adheres to the ſide of the rough ſtyle, and from thence is communicated to the ſtigma by certain canals. In the ſyngeneſious plants the ſtigmata riſe through a cylinder of the antheræ, and as each ſtigma comes up, it always brings along with it the fertilizing duſt; hence fecundation rarely fails in ſuch plants, as was obſerved before. 2. *Proportion.*—For the moſt part the ſtamina and piſtillum are of the ſame height, that the male duſt may more eaſily come at the ſtigma; but in ſome plants it is not ſo, and then a ſingular proceſs of fecundation may be obſerved. In the *Geranium Inquinans*, or African Tree Cranes-bill, with a thick mallow leaf and ſcarlet flower, where the piſtillum is ſhorter than the ſtamina, the flowers before they blow are pendulous, but upon their opening they ſtand upright, that the powder may fall upon the ſtigma; after which they again nod till the fruit is ripe, and then they ſtand upright a ſecond time, that their ſeeds may be more eaſily ſcattered about. The ſame may be ſeen in the *Claytonia Sibirica*. Some of the Pinks have piſtilla longer than the ſtamina: the flowers do not nod, but the piſtilla are reflected or bent back like rams horns towards the antheræ. The flower of the *Nigella Arvenſis*, or Horned Field Fennel Flower, when it firſt opens, has the five piſtilla erect and longer than the ſtamina; but when the flower is well expanded, the ſtyles are bent back that they may touch the antheræ which ſurround them: when they have received the male duſt they are again elevated, and ever after remain erect. In the Tamarind tree, Paſſion-flower, and Caſſias, the ſtyles are reflected nearly in the ſame manner towards the antheræ. 3. *Place.*—The ſtamina for the moſt part ſurround the piſtillum, ſo that ſome of the duſt is always blown by the wind on the ſtigma. Plants of the *Didynamia* claſs, which have their flowers erect, and ſtanding at an acute angle with the ſtem, bend their ſtamina and piſtilla to the upper lip of the flower, where the ſtigma, placed among the antheræ, is generally defended from rain. Plants of the *Diadelphia* claſs, which have their flowers nodding at an acute angle from the perpendicular line, have the ſtamina and piſtilla declining within the keel of the corolla, which is compreſſed or flat, that the fecundation may be thereby facilitated, while the vexillum keeps off the rain. Plants of the *Monœcia* claſs have the male flowers moſtly placed above the female, that the duſt may more readily fall on the piſtilla, as may be ſeen in the *Carex*, Indian Wheat, Job's-tears, Bur-reed, Cats-tail, leſſer Burdock, *Caſſava*, *Ambroſia*, Water-milfoil, Arrow-head, and *Palma Chriſti*. Yet there

which yet flouriſhes exceedingly; upon which he dilates into an accurate diſcourſe how it ſhould poſſibly be, all trees being held to receive their nutrition between the wood and the bark, and to periſh upon their ſeparation; this tree being likewiſe hollow as a drum, and its outmoſt ſurface, where decorticated, dry and dead. The ſolution of this phænomenon (to all appearance, from the verdant head) could not have been more philoſophically reſolved, than by the hypotheſis there produced by the

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are a few exceptions, among which we ſhall reckon the Pine and the Fir, where the antheræ are ſo very numerous, that if any animal, or the wind, ſhake the tree, we may ſee the duſt flying upwards like ſmoke; and ſo plentiful is the duſt, that if, in the time of flowering of the Pine, Fir, or Juniper, it chances to rain, the banks of the adjacent ſtanding waters are painted with yellow rings of the duſt from thoſe trees. The *Teucrium Flavum*, or Shrubby Germander, has a yellow corolla, the two upper ſegments of which aſcending, preſs like fingers the antheræ, which are placed on nodding filaments, to the ſtigma, that the genital powder may touch it, and they continue to cover it for ſome days after the fecundation, and then reſume their former place. The *Veratrum Album*, or White Hellebore, has its male flowers placed below, but the others and upper flowers are all hermaphrodites; for which reaſon the male flowers, as not being ſo neceſſary, are placed lower. 4. *Time.*—Here we are to obſerve, that the ſtamina and piſtillum come at the ſame time, and that not only in one and the ſame flower, but alſo where ſome are male and others female, on the ſame plant, a very few only excepted. The wonderful contrivance of the great Author of Nature in the *Jatropha*, or *Caſſava*, and the Plantain tree, is truly worth our obſervation The *Jatropha Urens*, or Prickly Caſſava, has a Corymbus, whoſe firſt or uppermoſt forks bear female flowers, which come out a day or two before the males; the other forks, or branches, of the Corymbus produce male flowers, but the female flowers, which come out firſt, cannot be impregnated by their duſt, becauſe they were withered before the males expanded; and therefore thoſe female flowers prove abortive, unleſs they are impregnated from ſome other Corymbus which has male flowers at the ſame time. The *Muſa Paradiſaica*, or Plantain tree, produces a ſpadix, which contains often two hundred germina, the few female flowers of which continue in blow for ſome days; when the female flowers have done blowing, the males ſucceed, and continue in flower till the fruit is ripe, in which are to be found no ſeed at all. Wherefore the authors of the Hortus Malabaricus have aſſerted that ſeeds were evidently wanting in the Plantain tree, which ſeemed a paradox to Linnæus; but when he ſaw the firſt female flowers deſtitute of males, and that the males which followed came too late to impregnate the females, he clearly perceived that no ſeeds would ever be produced in this ſpecies, unleſs ſeveral plants placed together were to flower nearly at the ſame time, and then one could impregnate the other. There is one thing farther remarkable in the *Muſa*, and that is, that it produces two ſorts of flowers very different in the ſame plant, ſome of which want the ſtigmata, and others the antheræ; the firſt may be called male herma-

Book II. Doctor, who aſſures me, he was yet deliberating whether the tree being hollow, it might not poſſibly proceed from ſome other latent cauſe, as afterwards he diſcovered; when having obtained permiſſion to open the body of it, he found another Elm letting down its ſtem all the length of this empty caſe, and ſtriking root when it came to the earth, from whence it derived nouriſhment, maintaining a flouriſhing top, and has, till now, paſſed for a little miracle, as it ſtill may do for a thing extraordinary, and

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phrodites, and the latter female hermaphrodites. Here then we have an unexampled ſpecies of Polygamy, where thoſe different flowers may impregnate each other, and one female joined with barren males is impregnated by the males belonging to another female, which is itſelf barren. Another thing which merits our obſervation in regard to time is, that when the male and female flowers are in diſtinct cups on the ſame plant, or on different plants of the ſame ſpecies, and where the male flowers are not erected perpendicularly over the females, there it is neceſſary that the flowering be over before the leaves come out, leſt the fecundation ſhould be hindered by the intervention of the leaves; *e. g.* in the Mulberry, Miſleto, Alder, Birch, Hornbeam, Beech, Oak, Haſel, Walnut, and alſo in the Willow, Sea-buckthorn, *Myrica* or Dutch Myrtle, Poplar, Aſh, and Dogs Mercury. 5. *Rains.*—In almoſt all ſorts of flowers we ſee how they expand or open by the heat of the ſun, but in the evening, and in a moiſt ſtate of the air, they cloſe or contract their flowers, leſt the moiſture getting to the duſt of the antheræ ſhould coagulate the ſame, and render it incapable of being blown on the ſtigmata; but (which is indeed wonderful) when once the fecundation is over, the flowers neither contract in the evening, nor yet againſt rain. Flowers with covered antheræ never ſhut up in the night-time; *e. g.* thoſe of the *Didynamia* and *Diadelphia* claſſes. The antheræ of the rye hang out beyond the flower, and if rain falls while it is in flower, the duſt is clotted, and hence the huſbandmen do truly predict a bad crop of rye, for the kernels are not ſo numerous, becauſe many of the florets prove abortive. But the antheræ of the barley lie ſo cloſe within the huſk, that the rain cannot get at it. If rain falls upon the bloom of the apple, pear, or cherry, the gardener immediately dreads the bloſſoms falling off, or proving abortive; and experience confirms the truth of this, for the powder of the antheræ is ſpoiled; yet this accident oftener happens in the cherry than the apple or pear, for all the antheræ of the cherry flowers diſcharge their duſt at once; but the caſe is not ſo in the others. Smoke alſo is injurious, by drying up the moiſture of the ſtigmata. 6. *Culture of Palm-trees.*—That the cultivators of the common Palm tree, or Date tree, cut off the male ſpadixes, and place them over the females, is recorded by Theophraſtus, Pliny, Proſper Alpinus, Tournefort, Kemfer, and others; and if they neglect to do this, the Dates are harſh, bad-taſted, and many trees wholly deſtitute of nuts or fruit. The Date-tree is every year thus impregnated in Arabia, Perſia, and Egypt, by the inhabitants. "The male ſpathæ being ripe (ſays Kemfer) are taken from the top of the tree, the ſpadixes taken out, and divided into leſſer branches, that

enough; for not only its paſſage, and how it ſhould come there, unleſs haply ſome of the ſamera, or ſeed, of the old tree, when pregnant, ſhould have luckily fallen down within the hollow pipe, or, as might be conjectured, from ſome ſucker ſpringing of a juicy root, but the ſtrange incorporating of the ſuperior part of the bole, with the old hollow tree which embraces it, not by any perceptible roots, but as if it were only one body with it, whilſt the reſt of the vaginated ſtem touches

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the rudiments of the fruit may be ſprinkled with the minute atoms of their duſt; a ſmall branch of the male ſpadix is fixed into the middle of the female ſpadix, and thus diſcharges its duſt on the ſeed-buds. It is remarkable that the ſpadixes dried are ſtill proper to impregnate the females, and may be kept a whole year without loſing their virtue. It ſometimes happens that the females are impregnated by the duſt blown to them by the wind; but ſince this is precarious, it is better done by the hand. If there is no impregnation, the female trees inevitably drop all the rudiments of the fruit, which is a great calamity to the owners, and to the country people in general, who are ſupported by their crop of dates, as we are by our crops of corn. I remember it happened in my time, that the Grand Signior meditated an invaſion of the city and territory of Baſſora, which the Prince of the country prevented, by giving out that he would deſtroy all the male Palm-trees on the firſt approach of the enemy, and by that means cut off from them all ſupplies of ſubſiſtence during the ſiege." Thus far Kemfer. Hear alſo what Tournefort ſays on this ſubject. "Hagdi Muſtapha, Ambaſſador from Tripoli, told me, that a branch of the flower of the male Palm was inſerted into the ſpatha of the female juſt at the time the ſpatha uſed to open; for when the flower is fully expanded, it ſheds its duſt, without the aſſiſtance of which the Dates would be harſh and ill-taſted, diſagreeable, and without ſtones or kernels, and only fit to be given to camels and other beaſts of burden." In the males and females of the *Piſtachia* Nut tree they obſerve the ſame method as in thoſe of the Date tree. "In Sicily (ſays Geofroy in his Materia Medica) the countrymen pluck cluſters of flowers from the male *Piſtachia*, with the fecundating duſt of which they impregnate the female flowers: Others gather the male flowers, expoſe them to dry in proper bags, and ſcatter the proliferous duſt on the female flowers, that the fruit may not prove abortive, and the crop fail." 7. *Nodding Flowers.*—Since the male duſt is generally of a greater ſpecific gravity than the air, in moſt plants that have the piſtillum longer than the ſtamina, the All-wiſe Creator has made the flowers nodding, that the powder may more eaſily reach the ſtigma, as may be ſeen in the common Snow-drop, greater Snow-drop, Sow-bread, *Narciſſus*, Fritillary, *Campanula*, Dogs-tooth Violet, &c. Now it cannot be ſaid that this happens merely from the weight of the flower, for ſometimes the fruit in the ſame plants, which is ten times heavier than the flower, grows erect, as in the Crown Imperial, Fritillary, and others. 8. *Sunk Flowers.*—The ſtems of many plants grow under water; but a little before they blow, the flowers emerge or riſe above the ſurface of the water, as

Book II. no other part of the whole cavity, till it comes to the ground, is ſurprizing. This being beſides very extraordinary, that a tree, which naturally grows taper as it approaches the top, ſhould ſwell, and become bigger there than it is below. But this the Doctor will himſelf render a more minute account of in the next impreſſion of that excellent piece of his; nor had I anticipated it on this occaſion, but to let the world know, in the mean

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we ſee in the Water-lily, Frogs-bit, Broad-leafed Pond-weed, Perennial Arſmart, &c. There are others in which all the parts grow under water, as the Water-milfoil, Water-ſoldier, ſeveral of the Pond-weeds, all which, about the time of flowering, raiſe their flowering ſtems above the water, which ſtems ſink again as ſoon as the time of flowering is over. The *Valliſneria* of Micheli, a kind of Pond-weed, which grows in Italy, bears a very long ſcapus, or flowering ſtem, but twiſted in form of a ſcrew; hence it appears very ſhort. This plant grows in rivulets and ditches under water, and bears on the extremity of its ſtem one flower only. About the time of blowing, the ſcapus is lengthened till the calyx has reached the ſurface of the water; which done, the flower is expanded, and after a few days, the flowering and impregnation being over, it ſinks again, the ſtem turning in a ſpiral form as before. This is the female plant. The *Valliſnerioides* of Micheli grows in the ſame places under water, having a flower ſtem ſcarce an inch high, which conſequently does not reach the ſurface of the water; this bears many flowers, which, when the time of flowering approaches, drop from the ſcapus, and riſe like little bladders; as ſoon as they have reached the ſurface of the water, though before ſhut, they then open, and ſwimming about, ſhed their duſt on the female flowers, which are alſo ſwimming in the ſame places. This is the male plant of the former. H. Cliff. 454. Micheli, without attending to the ſex, has carefully obſerved and faithfully deſcribed this circumſtance. 9. *Syngeneſious Flowers.*—The compound flowers are formed in different ways. In the *Polygamia Æqualis* all the florets are furniſhed with ſtamina and piſtilla. In the *Polygamia Superflua* all the florets have ſtamina and piſtilla in the diſk or middle of the flower, but in the radius there are only female flowers, which are impregnated by the male duſt of thoſe in the diſk. In the *Polygamia Superflua* the diſk is filled with hermaphrodite florets as in the former; but the female flowers, which conſtitute the radius, cannot ripen their ſeed, being all without ſtigmata. Laſtly, the florets of the *Polygamia Neceſſaria*, which fill the diſk, have the ſtamina and piſtilla, but for want of the ſtigmata theſe florets bear no ſeed, and the plants would all have been barren, had not the All-wiſe Creator furniſhed the radius, which conſiſts only of female florets, with compleat piſtilla that have the ſtigmata, and conſequently ripen the ſeed. 10. *Conſideration of all Sorts of Flowers.*—The tenth and laſt argument is drawn from the genuine conſideration of all ſorts of flowers. And here, for the ſake of brevity, we ſhall examine only a few out of the many that might be produced in proof of the Linnæan doctrine of the generation of plants. The *Celoſia*, or Cocks-comb, is furniſhed with a piſtilium ſurrounded by five ſtamina, whoſe filaments are joined below

time, how ingenuouſly ready he is to acknowledge the miſtake, as he has been ſucceſsful in diſcovering it. CH. VIII.

Deer, conies, and hares, by barking the trees in hard winters, ſpoil many tender plantations: Next to the utter deſtroying them, there is nothing better than to anoint that part which is within their reach, with ſtercus humanum, tempered with a little water or urine, and lightly bruſh-

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by a thin plaited film. In moiſt weather this film is relaxed, and the antheræ ſtand at a great diſtance from one another, but in dry weather the film is contracted, by which means the filaments come cloſe together, ſo that the antheræ almoſt touch the ſtigma, and hence the impregnation is aſſiſted. The Saxifrage has ten ſtamina, in the center of which are two piſtilla. After being in flower for ſome days, two of the ſtamina, which ſtand oppoſite to one another, meet, that their duſt may fall perpendicularly down on the ſtigmata, while their antheræ force open, as it were, each other's farini-ferous cells by rubbing againſt one another; next day theſe two ſtamina recede from one another, and two others ſupply their place, and thus they continue to do till all the males have diſcharged their duſt in the ſame manner. The graſs of Parnaſſus has five ſhort ſtamina, one of which, as ſoon as the filament is ſufficiently lengthened, touches the ſtigma with its anthera, and having diſcharged its fertilizing duſt, immediately riſes, and whereas it was bent inward before, it now bends backward, and the fila-ment grows afterwards almoſt as high as the corolla; then the ſecond ſtamen comes forward in the ſame way and manner; then the third, fourth, and fifth, till they have all diſcharged their office. The *Lychnis Flos Cuculi*, or Meadow Pinks, and the *Gypſophila Faſtigiata*, a kind of Sopewort, have procumbent ſtems; but when the time of flowering approaches, theſe are raiſed upright, that the duſt of the antheræ, being expoſed to the wind, may be more readily blown upon the ſtigmata. This is alſo the reaſon why the greateſt part of flowers are elevated on flowering ſtems above the ground, that the wind may more eaſily ſhake them. For the Narciſſus, Snow-drop, Violet, Croſs-wort, and ſome others, have their ſtems erect, but after the time of flowering, their ſtems recline to the ground.

Almoſt all the ſpiked plants begin their flowering below, or in the lower part of the ſtem, that in caſe the duſt of the firſt ſhould not prove ſufficient, that of the latter may make up the loſs. Of this ſort are alſo the corymbiferous and umbelliferous plants, not to ſay the compound flowers, where the florets conſtituting the radius open firſt, then follow the interior florets, and the diſk is elevated or raiſed, that the exterior florets may alſo receive ſome of their duſt, if they were not ſufficiently im-pregnated before. This is ſo certain and conſtant a rule, that when Linnæus found the *Hieracium Præmorſum*, the greater Broad-leaved Hawk-week, or greater Upright Mouſe-ear, obſerve a different order, *i. e.* the uppermoſt flowers come out firſt, he thought it a ſingular inſtance in nature. The Pellitory clearly ſhews us the proceſs of generation; if we obſerve it in a morning at a proper hour, we ſhall ſee how its an-

BOOK II. ed on; this renewed after every great rain: But a cleanlier than this, and yet which conies, and even cattle, moſt abhor, is to water or ſprinkle them with tanners' liquor, viz. that which they uſe for dreſſing their hides; or to waſh with ſlacked lime and water, altogether as expedient; alſo to tie thumb-bands of hay and ſtraw round them as far as they can reach.

Moſs (which is an adnaſcent plant) is to be rubbed and ſcraped off with ſome fit inſtrument of wood, which may not excorticate the tree, or

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theræ burſt with great elaſticity, and emit their duſt all round; and, of conſequence, alſo upon the piſtillum. The ſame experiment ſucceeds, if we touch the antheræ with the point of a needle, as Vaillant has obſerved. The Melons, Pompions, Cucumbers, Gourds, &c. have two ſorts of flowers; the one male, which are called barren; the other female, which bear the piſtilla and fruit. The gardeners adviſe, that the barren flowers ſhould be carefully plucked off, by reaſon they think theſe deprive the plant too much of its nouriſhment: But without doubt they are miſtaken; for they had better take the entire male flowers and ſprinkle the females with their duſt at noon, or roll the male flowers on the female, by which means the male duſt will readily reach the ſtigmata, and the females thus impregnated will ripen their fruit; for the reaſon why the fruit drops off is for want of being impregnated, and not for want of nouriſhment, as is the vulgar opinion. Hence it is, that if gardeners do not give air to their ſtoves, ſo that generation may be aſſiſted by the help of the wind, the fruit drops off, or miſcarries. In 1723, a Pompion flowered in Stenbrohalt Garden, the male flowers of which were carefully plucked off every day, as ſoon as they appeared, leſt they ſhould draw from the female flowers too much of their nouriſhment; the conſequence was, that not one fruit appeared on the plant that ſeaſon. If one pluck the flowers of the male Hemp, before thoſe of the female plant are opened, he will get none, or but very few ripe ſeeds. Yet it happens ſometimes, that the female Hemp bears one or two male flowers, by which ſome of the females may be impregnated; and this circumſtance deceived Camerarius. The Hops are of two ſorts, the one male, and the other female; and that which they commonly call the fruit, is only the calyx expanded and lengthened; hence the female plants, though not impregnated, can bear cones. This it was which deceived Tournefort, ſo that he would not acknowledge the ſexes of plants, becauſe a female plant of the Hop in the garden at Paris throve well, and bore fruit in plenty every year, when no male plants were within ſeveral miles of it. The ſame thing happens in the Mulberry and Blite, the berries of which are only ſucculent calyxes, but not ſeed-veſſels or ovaria. One Richard Baal, a gardener at Brentford, ſold a great quantity of Cauliflower ſeed, which he raiſed in his own garden, to ſeveral gardeners in the ſuburbs of London, who carefully ſowed the ſeeds in good ground, but they produced nothing but the common long-leaved Cabbage, for which reaſon they complained that they were impoſed upon, and commenced a ſuit againſt the aforeſaid Baal in Weſtminſter Hall; the Judge's opinion was, that

with a piece of hair-cloth after a ſobbing rain; or by ſetting it on fire with a wiſp of ſtraw, about the end of December, if the ſeaſon be dry, as they practiſe it in Staffordſhire; but the moſt infallible art of Emuſcation, is taking away the cauſe (which is ſuperfluous moiſture in clayey and ſpewing grounds) by dreſſing with lime.

Ivy is deſtroyed by digging up its roots, and looſening its hold; and even the removal of Ivy itſelf, if very old, and when it has long inveſted

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Baal muſt return the gardeners their money, and alſo make good their loſs of time and crops. Ray's Hiſt. v. I. p. 42. This cheat we ought not to lay to the poor gardener's charge, for it is wholly to be aſcribed to his good plants being impregnated by the common Cabbage. Wherefore, if one has an excellent ſort of Cabbage, he ought not to let it flower in the neighbourhood of an inferior ſort, leſt the good ſort ſhould be impregnated with the duſt of the other, and the ſeeds produce a degenerate race. If one intends to plant the Poplar or Willow for walks, let him take only the male plants for this purpoſe; for if the females are planted, they will multiply ſo faſt as to form a grove inſtead of a walk. The Juniper does not produce fruit every year in equal plenty; for if rain falls during its time of flowering, the fruit is deprived of the farina, and falls off. A female plant of the Juniper grew for many years in Clifford's garden, but never produced any fruit for want of a male plant. The *Rhodiola*, or Roſe-wort, grew in the Upſal garden from the year 1696, at which time Profeſſor Rudbeck brought it thither from the mountains of Lapland; but it never ripened its ſeeds, being without a male plant. It is needleſs to mention more examples, though I could eaſily deduce ſome ſingular experiments from many more plants, to corroborate our doctrine of the generation of plants, which the brevity of this diſſertation does not allow. I ſhall not ſpeak of the Maize, the generation of which is denied by Siegeſbeck and others, from the ſituation of the antheræ and piſtilla; but refer for this to a Treatiſe written by Mr. Logan, of Philadelphia, intitled, Experiments concerning the Generation of Plants. Concerning the Haſel, ſee the Experiments of Mr. Bradley, late Profeſſor of Botany in Cambridge. As to the Fig tree, we ſhall explain its peculiar manner of generation, which is called Caprification, more at large. Tournefort, while he was in the iſlands of the Archipelago, accurately obſerved this, and has deſcribed it in the following manner. "There are three varieties of the *Caprificus*, or Wild Fig, (which is the male) called by the natives *Fornites*, *Cratirites*, and *Orni*. Theſe produce their fruit at three different times of the year; the fruit of the *Fornites*, or firſt variety, begin to bud in Auguſt, and hold to the end of November, at which time many ſmall inſects make their eſcape from them, and lay their eggs on the *Cratirites*, or ſecond variety, whoſe fruit is now coming out. The *Cratirites*, or ſecond variety, bud in the end of September, and hold till May following. The inſects ſometimes come out of theſe before the *Orni*, or third variety, are budded; in which caſe, the huſbandmen carefully ſeek for thoſe trees of the *Cratirites* whoſe

BOOK II. its ſupport, is attended with pernicious conſequences, the tree frequently dying from the ſudden expoſure to unaccuſtomed cold. Of the roots of Ivy (which ſhrub may, with ſmall induſtry, be made a beautiful ſtandard) are made curiouſly poliſhed and flecked cups and boxes, and even tables of great value. Miſleto and other excreſcences are to be cut and broken off. But the fungi (which prognoſticate a fault in the liver and entrails of trees, as we may call them) is remedied by abraſion, fricțition, interlucation, and expoſure to the ſun.

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inſects have not yet come out, and tie them on the branches of the *Orni*, that the inſects may lay their eggs thereon. The *Orni*, or third variety, bud in May, and are ripe in July. In all the three varieties, certain inſects are generated, which depoſite their eggs, and theſe eggs become worms, and afterwards are turned into flies before the fruit falls off. The countrymen chiefly gather the *Orni* in June and July, a little before the dog-days, or when the inſects begin to fly, and tie them with threads to the cultivated Fig tree; then the inſects, by wounding the orifices of the cultivated Figs, make their way into the cavities of the fruit, which ripen after this in about fourteen days." This riddle we ſhall now explain. The *Caprificus*, or Wild Fig, is the male plant, and the cultivated Fig the female. The flowers are diſpoſed within the cavity of the receptacle, which is ſo cloſe ſhut, that often it will ſcarce admit the end of a common needle through the pore in its extremity. Now the fig-flies, which are of the ichneumon kind, being transformed, and furniſhed with wings, about the time the farina of the male Fig is ripe, make their eſcape from thoſe male Figs, and being wholly covered with their duſt, after copulation, they ſeek for a place to lay their eggs, and flying to every one of the female Figs, they enter their cavities, which are filled with piſtilla from all ſides, by which means they muſt neceſſarily bruſh off that farina, or male duſt, with which they were covered, and thus the ſeeds are impregnated. It is true, the female Fig can ripen its fruit, though the ſeeds are not impregnated, becauſe this fruit is not a pericarpium, or ſeed-veſſel, but only a receptacle: ſo alſo the Hop, Mulberry, Strawberry, and Blite, can produce fruit, tho' their ſeeds do not ripen, becauſe their fruit is nothing but a receptacle or calyx. Some botaniſts who were ignorant of this, ſeeing thoſe trees produce fruit without previous impregnation, thought they had found an unanſwerable argument againſt the generation of plants; but they did not conſider, that the fruit of the Fig is not a ſeed-veſſel, but a common receptacle. Yet it appears, that the fruit of the Fig, if the ſeeds are impregnated, grow to a much larger ſize than thoſe which are not; which Tournefort alſo obſerved; for he tells us, that a Fig tree, in Franche Compte, where there is no caprification, produced every year only twenty-five pound weight of Figs; but that another of the ſame ſize in one of the iſlands of the Archipelago, produced yearly two hundred and eighty pound weight of Figs, which is above ten times the quantity of the other. This age hath clearly refuted the opinion of Camerarius, who maintained that the ſeeds of Figs never produced any plants. For Linnæus tells us, that

The bodies of trees are viſited with canker, hollowneſs, hornets, earwigs, ſnails, &c. CH. VIII.

The wind-ſhock is a bruiſe and ſhiver throughout the tree, though not conſtantly viſible, yet leading the warp from ſmooth renting, cauſed by over-powerful winds, when young, and perhaps by ſubtil lightnings, to which the ſtrongeſt Oaks, and other the moſt robuſt trees, are fain to ſubmit, and will be twiſted like a rope of Hemp; and therefore, of old, not

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Fig trees are raiſed every year in Holland from the ſeeds, provided the fruit is brought from Italy. But if the fruit grew in France, England, Germany, or Sweden, where there are no Wild Figs, the ſeeds produce nothing; on the other hand, if thoſe ſeeds are ſown, which grew in Italy or the Greek iſlands, where the male Fig abounds, the plants ſpring up with eaſe, putting forth leaves, which at firſt are like thoſe of the Mallow. The ſame experiment was tried with good ſucceſs in the Upſal garden in the year 1744. I ſhall only briefly mention the utility of inſects in the fecundation of plants. In a great many flowers there is a nectarium, or honey-juice, ſeparated by the flower, which Pontedera thinks is that balſam which the ſeeds imbibe, to make them keep and preſerve their vegetative quality longer; and as long as this balſam is not dried up or ſpoiled, ſo long the ſeeds are fit to germinate. Several inſects, as bees, flies, butterflies, live on this honey-juice only. Quintilian, the Roman Orator, has a very ſingular caſe in one of his Orations: "A poor man and a rich man, ſays he, had each a ſmall garden adjoining to one another. The rich man had many fine flowers in his garden, and the poor man had bees in his. The rich man complained that his flowers were ſpoiled by the poor man's bees, which he warned him to remove. The poor man not complying, the other ſcattered poiſon on his flowers; on which the poor man's bees all died; and Dives is guilty of this great injury. The poor man pleads that the bees did no hurt at all to the rich man's flowers; that neither the Creator, nor any human laws, had ever reſtrained bees within any certain limits; and therefore the rich man might hinder the bees from ſettling on his flowers if he could." But the other might have objected, that the bees were ſo far hurtful to his flowers, that they ſucked the honey-juice, and carried off the fertilizing duſt.——After all, my opinion is, that the bees are more uſeful than hurtful to flowers, ſince by their unwearied labours they ſpread the fertilizing duſt, ſo that it may reach the piſtillum: for it is not clear what uſe the honey-juice is of in the œconomy of flowers. From what has been ſaid it appears, that the generation of plants is performed by the genital duſt of the antheræ falling on the moiſt ſtigma, or female organ, which duſt by the help of the moiſture adheres and burſts, diſcharging its contents, the ſubtle particles of which are abſorbed by the ſtyle, into the ovarium, germen, or ſeed-bud. We deny, however, that the duſt of the antheræ penetrates through the ſtyle to the germen and rudiments of the ſeed, as Moreland, Geofroy, Logan, and ſome others, have ſuppoſed; for one example of the Poppy, from Vaillant, will be ſufficient to diſprove this, ſince it appears,

Book II. uſed to kindle the ſacrifice. Trees likewiſe often ſuffer the ſame injury by rigorous and piercing colds and froſts; ſuch as in the year 1683, ſplit many ſtately timber-trees from head to foot; which, as the weather grew milder, cloſed again, ſo as hardly to be diſcerned, but were found at the felling miſerably ſhattered, and good for little: The beſt prevention is ſhelter, choice of place for the plantation, and frequent ſhreading, whilſt they are yet in their youth. Wind-ſhaken is alſo diſcovered by certain ribs, boils, and ſwellings on the bark, beginning at the foot of the ſtem,

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by ocular inſpection, to be falſe. The ſpecies meant, is the *Papaver Orientale*, or the Oriental Rough Poppy, with a large flower. If one opens a flower of this plant, cutting its piſtillum perpendicularly downwards, he ſhall find the lamellæ, or folds, the placentæ, and the ſmall ſeeds ſticking to them, all of a pure white colour, though at the ſame time the ſtyle and all the ſtigma are wholly tinged with a purple hue from the duſt of the antheræ. From whence we may fairly conclude, that not one grain or particle of the farina enters the folds of the receptacle, or the ſeeds themſelves. The *Malva Alcea*, and the *Malva Moſchata*, *i. e.* the Vervain Mallow, and the jagged-leafed Vervain Mallow, have kidney-ſhaped antheræ, or ſummits, which contain a duſt conſiſting of large globular particles conſpicuous enough to the naked eye, and having their diameters equal to thoſe of the ſtyles; whence it is evident they never can paſs through the ſtyles. Needham has obſerved, that the duſt of Martagon Lily conſiſts of rough or prickly globules, which, as ſoon as they touch any moiſture, burſt on the ſides, and, like an Æolipile, with great impetuoſity diſcharge a gelatinous matter, filled with innumerable points and atoms, which impregnate the ovula, or rudiments of the ſeeds. All the females alſo among animals diſcharge a ſeminal fluid at the ſame time with the males, and therefore this ſeminal fluid is alſo neceſſary on the part of the female. This ſame viſcid and ropy fluid on the ſtigmata of plants is called by Malpighi, a turpentine, or balſam. Hence Ray alſo ſays, that in no kind of animals that he knew did the ſperm enter the ovarium, and in many kinds not even the uterus, or womb itſelf, but only its exceeding ſubtle effluvia to impregnate the ovula, or eggs. Upon the whole, I think that the flowering of plants may be truly called their generation, and that the Antients with great propriety named the flower, the joy of plants.

The calyx then is the marriage-bed, in which the ſtamina and piſtilla, the male and female organs, celebrate the nuptials of plants; and here alſo thoſe tender organs are cheriſhed and defended from external injuries. The corolla, or petals, are the curtains, cloſely ſurrounding the genital organs, in order to keep off ſtorm, rain, or cold; but when the ſun ſhines bright, they freely expand, both to give acceſs to the ſun's rays, and to the fecundating duſt. The filaments are the ſpermatic veſſels by which the juice, ſecreted from the plant, is carried to the antheræ. The antheræ are the teſticles, and may not improperly be compared to the ſoft roe or milt of fiſhes. The duſt of the antheræ anſwers to the ſperm and ſeminal animalcules; for, though

and aſcending the body of the tree to the boughs. But againſt ſuch froſts and fire from heaven there is no charm. CH. VIII.

Cankers, of all other diſeaſes the moſt pernicious, corroding, and eating to the heart, and difficult to cure, (whether cauſed by ſome ſtroke, or galling, or by hot and burning land) are to be cut out to the quick, the ſcars emplaſtered with tar mingled with oil, and over that a thin ſpreading of loam, or elſe with clay and horſe-dung, but beſt with hogs-dung alone,

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it is dry, that it may the more eaſily be conveyed by the wind, yet it gets moiſture upon touching the ſtigma. The ſtigma is that external part of the female organ which receives the male duſt, and on which this male duſt acts. The ſtyle is the vagina, or tube, through which the effluvia of the male duſt paſs to the germen or ſeed-bud. The germen is the ovary, for it contains the unimpregnated or unfertilized ſeeds. The pericarpium, or ſeed-veſſel, anſwers to the impregnated ovary; and, in fact, is the ſame with the germen, or ſeed-bud, only increaſed in bulk, and loaded with fertile ſeeds. The ſeeds are the eggs, of which we have already fully ſpoken.—— We ought to obſerve, that the calyx is a production of the external bark of the plant; the corolla, of the inner bark; the ſtamina, of the Alburnum, or white ſap; the pericarpium, or ſeed-veſſel, of the woody ſubſtance; and the ſeeds, of the pith of the tree; for in this manner they are placed; and in this manner alſo they are unfolded. Therefore in a flower we find all the internal parts of a plant unfolded. This, though obſcurely, was taken notice of by Cæſalpinus, and alſo by Mr. Logan of Philadelphia. Flowers then are nothing elſe but the genitals of plants, with this difference from thoſe of animals, that *their* organs of generation are reckoned obſcene, and modeſty forbids us to examine them; for which reaſon nature has taken care frequently to hide them from our ſight. But in the vegetable kingdom it is quite otherwiſe; for here thoſe parts are not hid, but rather expoſed to the view of all. Add to this, that they are the moſt beautiful of all the parts of plants, in which the ſtudy, love, and contemplation of men are converſant. As the genitals of all animals have a rank and ſtrong ſmell in rutting time, ſo the flowers, or genitals, of plants alſo ſend forth a ſmell, which, though very different in different plants, is for the moſt part very agreeable, ſo that one fancies himſelf drinking nectar with his noſtrils. We ſee then how the great Creator has enriched the moſt innocent nuptials of plants with the moſt ſingular and ſuperb ornaments. Let us behold the marriage-bed, or calyx; with what art is it conſtructed! the curtain, or ſuperb covering, called the corolla, how neat and elegant its extremity or termination, how ſplendidly cut or carved, how fine and thin, and with what lively and beautiful colours is it adorned! We may truly ſay, in the emphatical language of the ſcriptures, *that Solomon in all his glory was not arrayed like one of theſe.* The *Amaranthus Tricolor* wants this beautiful covering of the corolla; but here nature has taken care to cover the flowers with a ſhade or fine-coloured crown of the leaves, which is laid over the flowers, that the few males, being defended from

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bound to it in a rag; or by laying Wood-aſhes, Nettles, or Fern to the roots. You will know if the cure be effected, by the colour of the wounds growing freſh and green, and not reddiſh: But if the gangrene be within, it muſt be cured by nitrous, ſulphureous, and drying applications, and by no means by any thing of an unctuous nature, which is exitial to trees, tar, as was ſaid, only excepted, which I have experimentally known to preſerve trees from the envenomed teeth of goats, and other injuries; the entire ſtem ſmeared over, without the leaſt prejudice, to my no ſmall ad-

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ſhowers, might more eaſily and ſafely diſcharge their farina on the females below. All animals appear moſt beautiful and healthy juſt before their copulation. The hart toſſes up his prominent horns; the birds ſhine and glitter with gay colours; the fiſhes taſte then moſt deliciouſly. But when the time of copulation is over, the hart loſes his lofty or towering horns; the birds loſe much of their beauty; and the fiſhes a great deal of their former flavour or fine taſte. Now plants are ſubject to the ſame changes: for in the ſpring and flowering time their verdure and beauty is moſt amazingly gay; but, when that is over, they loſe much of their former ſplendor. Thus copulation weakens and debilitates. In the ſilk-worm, moths, and butterflies, one may ſee, when their copulation is over, how their wings droop, and their life expires; but if a butterfly is ſhut up in a room alone, and not ſuffered to copulate with others, it will often remain in health and vigour for half the year. In the annual and biennial plants one may obſerve, that before they have flowered, they reſiſt the cold of winter, *e. g.* the Pinks, Lichniſes, and others; but if they flower the firſt year, as ſoon as winter approaches they generally die; if, on the other hand, they do not flower, they will often continue in vigour three or four years. The Plantain tree has often continued in the gardens of Holland for a hundred years; but when it has once flowered, no art, ſkill, or experience, can prevent its lofty ſtem from periſhing the year following. The *Corypha*, or Umbrella Palm tree, remains barren for thirty-five years, growing in that time to the height of ſeventy feet; and in the ſpace of four months after that time, it riſes thirty feet higher, puts forth its flowers, and produces its fruit the ſame year; which done, it totally dies, both root and ſtem. Hort. Cliff. 482. The *Lavatera Arborea*, or Sea tree Mallow, will riſe to the height of a common Pear tree, bearing the winter froſts very well; but when it has once blown, though it were to produce but one flower only, not all the aſſiſtance of gardeners, or green-houſes, or any art, can prevent its periſhing on the firſt approach of winter.

The ſtomach of plants is the earth, from which they receive their nouriſhment; and the fineſt and moſt ſubtle part of their ſoil is their chyle. The root, which carries the chyle from the ſtomach to the body of the plant, is analogous to the lacteals or chyliferous veſſels of animals. The trunk, which ſupports and gives ſtrength to the whole plant, is analogous to the bones. The leaves, by which plants tranſpire, are inſtead of lungs. The leaves may be alſo compared to the muſcles of animals; for by their agitation with the wind the plant is put in motion. For this reaſon, herbs

miration. But for over-hot and torrid land, you muſt ſadden the mould about the root with pond-mud, and neats-dung; and by graffing fruit-trees on ſtocks raiſed in the ſame mould, as being more *homogeneous*. CH. VIII.

Hollowneſs is contracted, when, by reaſon of the ignorant or careleſs lopping of a tree, the wet is ſuffered to fall perpendicularly upon a part, eſpecially the head, or any other part or arms, by which means the rain is conducted to the very heart of the ſtem and body of the tree, which

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furniſhed with leaves cannot thrive, except they have air; but ſucculent plants, which have no leaves; *e. g.* ſome of the *Euphorbias*, Torch-thiſtles, Melon-thiſtle, Prickly-pear, and the *Stapelia*, though ſhut up in green-houſes, and quite deprived of the external air, do thrive very well. If you ſhut up a tree or a ſhrub, which is full of leaves, in a cloſe room in the ſummer-time, it will die; but if in the winter, when it has loſt all its leaves, it will remain ſafe. Heat is to plants analogous to the heart in animals. Plants have no heart, nor indeed have they any occaſion for ſuch an organ, for they live in the ſame manner as Polypes do in the animal kingdom: their juices mixed with air are propelled through their veſſels, but not circulated back again by returning veſſels. The blood-veſſels of animals are divided into various branches, ſo alſo are the veſſels of plants. Plants, for the moſt part, have their genital organs placed at their ramifications; in the ſame manner animals have theirs at the ramification of the iliac veſſels, with this difference however, that the ramifications of plants aſcend, whereas thoſe of animals go downwards or backward; hence the antients called a plant an inverted animal.

From what has been ſaid it follows, that a flower, which is furniſhed with antheræ, but wants the ſtigmata, is a male flower; that a flower which has ſtigmata, but no antheræ, is a female; and one that has both, is an hermaphrodite flower. Nor need we wonder, that in the vegetable kingdom many plants are hermaphrodite, though in the animal kingdom there are very few of this kind; for here one ſex can eaſily go to the other; whereas plants are fixed to one ſpot, and cannot go from it. Juſtly therefore has the All-wiſe Creator furniſhed ſnails and other ſlow-paced animals with the genital organs of both ſexes, leſt (ſeeing they rarely meet) the ſpecies ſhould be extinct or loſt; during their copulation then, the one acts on the other, and each acts the part of male and female, while both impregnate and are impregnated by each other.

We call a plant which has only male flowers, a male plant; that which has only female flowers, a female plant; and that which has only hermaphrodite flowers, an hermaphrodite plant. A fourth ſort, having on one and the ſame ſtem both male and female flowers diſtinct, is called an androgynous plant. There is alſo a fifth ſort, namely, when on one and the ſame plant there are not only hermaphrodite flowers, but alſo male or female flowers; and this is called a polygamous plant. When male flowers are added to the hermaphrodite, they ſerve to impregnate thoſe which have not

Book II. it ſoon rots. In this caſe, if there be ſufficient ſound wood, cut it to the quick, and cloſe to the body, and cap the hollow part with a tarpaulin, or fill it with good ſtiff loam, horſe-dung and fine hay mingled, or with well-tempered mortar, covering it with a piece of tarpaulin. This is one of the worſt of evils, and to which the Elm is moſt obnoxious. Old broken boughs, if very great, are to be cut off at ſome diſtance from the body, but the ſmaller cloſe.

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been impregnated by their own males, *e. g.* in the Croſs-wort, and White Hellebore; or, if female flowers are added, they are impregnated by the farina of the hermaphrodite flowers, as in the *Pellitory* and *Orrache*. It is very remarkable, that the ſeeds of the hermaphrodite flowers in the *Orrache* are altogether unlike to the ſeeds of the female flowers both in ſhape and ſize, yet they produce the ſame plant, as well as the ſeeds of compound flowers do, which grow in the diſk and in the radius, or in the center and margin of the flower. To this place we may refer a third ſort of polygamous plants, in which there are two ſorts of hermaphrodite flowers on one individual, one ſort wanting the ſtigmata, and the other the antheræ, as in the Plantain tree.

When there are more petals in flowers than they ought to have, ſuch are ſaid to be luxuriant; and they are of three ſorts, viz. Full, when all the ſtamina are wanting, and petals only grow in their room: Multiplied, when ſome of the ſtamina are wanting, and ſome remain; or Proliferous, when another flower with its proper flower-ſtalk grows out of the piſtillum, or center of the flower. All luxuriant flowers are juſtly reckoned monſters, ſince the eſſential parts are changed into a different nature and figure: which, notwithſtanding, is much admired by floriſts, who take great delight in full and multiplied flowers or double flowers, as they commonly call them. It is remarkable, that when monopetalous flowers are changed into luxuriant or full ones, only the corolla is increaſed, as in the Gelder Roſe, African Marygold, Feverfew, &c. And this holds chiefly in compound flowers, and but ſeldom in any other. Hence we may ſee, that no full flowers are ever natural, but always propagated from ſingle ones, for nature never produces any race of mere monſters. Theſe full flowers are at firſt produced from a ſuperabundance of nouriſhment. And ſince theſe full flowers are deſtitute of ſtamina, they are conſequently deprived of the male organs of generation, which ſhould impregnate the ſtigmata; but no ſeeds will germinate, (as we have obſerved before) unleſs they have been fertilized by the male duſt; therefore ſuch flowers muſt neceſſarily be barren, or produce no ſeeds. Of this ſort are the Pinks, the *Hepatica*, Stock July-flower, Indian Creſs, Pomegranate, Roſe, *Ranunculus*, Marſh-marygold, *Lychnis*, Violet Wall-flower, Piony, *Narciſſus*, &c. All theſe, with full flowers, never produce ſeeds, but are propagated by ſuckers, off-ſets, or ſlips, *i. e.* by dividing the roots. I am well aware, that the Poppy, the Fennel flower, and ſome few among the compound flowers, do ſometimes produce good ſeeds, becauſe ſome of their ſtamina remain to impregnate the piſtillum. The ſame way of reaſoning may be applied to all proliferous flowers, *e. g.* the *Ranunculus*, Roſe, *Avens*; for they are all

Hornets and waſps, by breeding in the hollowneſs of trees, not only infect them, but will peel them round to the very timber, as if cattle had unbarked them, as I obſerved in ſome goodly Aſhes at Caſſiobury, (near the garden of that late noble Lord, and lover of planting, the Earl of Eſſex) and are therefore to be deſtroyed by ſtopping up their entrances with tar and gooſe-dung, or by conveying the fumes of brimſtone into their cells. Cantharides attack the Aſh above all other botts of the beetle kind. Chafers, &c. are to be ſhaken down and cruſhed; and when they come in armies, (as ſometimes in extraordinary droughts) they are to be driven away or deſtroyed with ſmoak, which alſo kills gnats and flies of all ſorts. Note, that the Roſe-bug never, or very ſeldom, attacks any other tree whilſt that ſweet buſh is in flower. Whole fields have been freed from worms by the reek and ſmoak of ox-dung wrapt in mungy ſtraw, well ſoaked with ſtrong lye.

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barren, becauſe they want the germen, and female parts of generation, when the prolification is from the center of the flower; but their offspring ſometimes produce good ſeeds, providing they are not full flowers.

From this diſſertation the reader may perceive, how ſimilar nature is to herſelf, and how exact in following her own laws in all her works. Who would ever believe ſo many truths were diſcoverable concerning plants? though, without doubt, there are many more that remain ſtill undiſcovered. I ſhall conclude with the words of Pliny: "That there is in plants a natural inſtinct to generation; and that the males, by a certain blaſt and ſubtle powder, do conſummate the nuptials on the females."——— Nat. Hiſt.

4. AGE. No one can doubt but that every living thing has its beginning and ending, and undergoes innumerable changes. Thus we ſee, that infancy is weak, feeble, barren; but youth is comely, flouriſhing, and luxuriant; manhood is fertile, plump, ſtrong, and of full ſtature; and, laſtly, old age flags, droops, becomes dry, hoary, languid, the ſad preſages of its approaching diſſolution. And are not plants ſubject to the ſame viciſſitudes, and go through the ſame ſtages? In their infant or very youthful ſtate they are ſmall and weak, deſtitute of flowers and fruit; when more advanced, they wanton in beautiful and ſhining flowers, being then moſt agreeable, and, as it were, in the joyous ſpring of life; in ſummer, being then more plump, firm and ſtrong, but leſs ſplendid, they bear fruit; in autumn, or old age, they droop, grow dry, and wither, returning to duſt from whence they came. The Ivy in its firſt or tender ſtate has ſpear-ſhaped leaves, and bears neither flowers nor fruit. This is that variety which Bauhine calls *Hedera humi repens*, Ivy creeping on the ground. The ſame plant, when more advanced, bears five-lobed leaves, climbs on trees and walls, and is barren. This variety Bauhine calls *Hedera major ſterilis*, the greater barren Ivy. In

BOOK II.

Earwigs and ſnails do ſeldom infeſt foreſt-trees, but thoſe which are fruit-bearers, and are deſtroyed by ſetting boards or tiles againſt the walls, or the placing of Neat-hoofs, or any hollow thing upon ſmall ſtakes; alſo by enticing them into ſweet waters, and by picking the ſnails off betimes in the morning, and rainy evenings. I adviſe you to viſit your Cypreſs trees on the firſt rains in April; you ſhall ſometimes find them covered with young ſnails no bigger than ſmall peaſe. Laſtly, branches, buds, and leaves extremely ſuffer from blaſts, jaundice and caterpillars, locuſts, rooks, &c. Note, that you ſhould viſit the boards, tiles, and hoofs, which you ſet for the retreat of thoſe inſects, in the heat of the day, to ſhake them out, and kill them.

The blaſted parts of trees, and gum, ſhould be cut away to the quick; and to prevent it, ſmoak them in ſuſpicious weather, by burning moiſt ſtraw with the wind, or rather the dry and ſuperfluous cuttings of aromatic plants, ſuch as Roſemary, Lavender, Juniper, Bays, &c. I uſe to whip

NOTES.

its next or more mature ſtate it ſends forth three-lobed leaves, and, leaving its props and ſupporters, it riſes by its own ſtrength, and puts on the appearance of a pretty tall tree, being loaded with flowers and fruit. This is the *Hedera Arborea* of C. B. Tree Ivy. But when old, it puts forth egg-ſhaped leaves without lobes. This is the *Hedera Poetica* of C. B. Poets' Ivy. Daily experience abundantly ſhews, that all plants, as well as the Ivy, undergo the ſame fate. From the ſeed ſpring up tender ſhoots, which at firſt are not larger than ſmall ſhrubs; then, by degrees, they acquire a firm trunk, and alſo bear flowers and fruit; laſtly, the branches flag, and are covered, as well as the trunk, with moſs, firſt one branch decaying, and then another, till the whole tree moulders away, and *the place thereof knoweth it no more.*

5. DISEASES. When life, in any manner of way, is hurt or injured, that ſtate we call Diſeaſe; to which vegetables, as well as animals, are ſubject. By too great heat they are parched, become languid, and droop; by too much cold they are often killed, or made ſubject to cold tumours, analogous to kibes and chilblains in the human body. Sometimes they are liable to canker, ſometimes to vermin, from whence they are ſaid to be louſy.

6. DEATH. Death is the privation of life. Every living thing is ſubject to death, as conſtant experience teaches. Since then, we know that vegetables as well as animals die by diſeaſes and external injuries, we may aſk, How can vegetables exchange life for death, if they were not previouſly endued with life? For if we break a ſtone, which has no life, into a thouſand parts, it by no means undergoes ſuch a change as we obſerve in vegetables.

and chaſtiſe my Cypreſſes with a wand, after their winter-burnings, till all the mortified and ſcorched parts fly off in duſt, as long almoſt as any will fall, and obſerve that they recover and ſpring the better. Mice, moles, and piſmires cauſe the jaundice in trees, known by the diſcolour of the leaves and buds.

The moles do much hurt, by making hollow paſſages, which grow muſty; but they may be taken in traps, and killed, as every woodman knows: It is certain that they are driven from their haunts, for a time, by garlick, and other heady ſmells, buried in their paſſages.

Mice and rats are taken with traps, or by ſinking ſome veſſel almoſt level with the ſurface of the ground, the veſſel half full of water, upon which let there be ſtrewed ſome hulls or chaff of oats; alſo with bane, powder of orpiment in milk, and aconites mixed with butter: copperas or green glaſs broken with honey, morſels of ſponge chopped ſmall and fried in lard, &c. are very fit baits to deſtroy theſe nimble creatures, which elſe ſoon will ruin a ſemination of nuts, acorns, and other kernels in a night or two, and rob the largeſt beds of a nurſery, carrying them away by thouſands to their cavernous magazines, to ſerve them all the winter: I have been told that Hop branches ſtuck about trees, preſerve them from theſe thieviſh creatures.

Deſtroy piſmires with ſcalding water, and diſturbing their hills, or rubbing the ſtem with cow-dung, or a decoction of Tithymale, waſhing the infeſted parts; and this will inſinuate, and chaſe them quite out of the chinks and crevices, without prejudice to the tree, and is a good prevention of other infirmities; alſo by laying ſoot, ſea-coal, ſaw-duſt, or refuſe tobacco where they haunt, often renewed, eſpecially after rain; for becoming moiſt, the duſt and powder harden, and then they march over it.

Caterpillars are deſtroyed by cutting off their webs from the twigs before the end of February, and burning them; the ſooner the better: If they be already hatched, waſh them off with water, in which ſome of the caterpillars themſelves and garlick have been bruiſed; the juice of rue, decoctions of coloquintida, hemp-ſeed, wormwood, tobacco, walnut-ſhells when green, with the leaves of ſage, urine and aſhes, make good aſperſions. Take of two or three of the ingredients, of each an handful; make

Book II. them boil in two pails of water for half an hour, then ſtrain the liquor, and ſprinkle it on the trees infected with caterpillars, the black flea, &c. in two or three times it will clear them, and ſhould be uſed about the time of bloſſoming. Another method is to choak and dry them with ſmoak of galbanum, ſhoe-ſoals, and hair; and ſome affirm, that planting Piony near them is a certain remedy; but there is no remedy ſo facile as the burning them off with ſmall wiſps of dry ſtraw, which in a moment rids you.

Rooks do in time, by pinching off the buds and tops of trees for their neſts, cauſe many trees and groves to decay. Their dung propagates nettles and weeds, and choaks young ſeedlings. They are to be ſhot, and their neſts demoliſhed. The Bullfinch and Titmouſe alſo eat off and ſpoil the buds of fruit-trees; theſe are prevented by clappers, or caught in the wire mouſe-trap with teeth, and baited with a piece of ruſty bacon; alſo with lime-twigs. But if cattle break in before the time, *conclamatum eſt*, eſpecially goats, whoſe mouths and breath is poiſon to trees, they never thrive well after, and Varro affirms, if they but lick the Olive trees, they become immediately barren. And now we have mentioned barrenneſs, we do not reckon trees to be ſterile, which do not yield a fruitful burden conſtantly every year (as Juniper and ſome Annotines do) no more than of pregnant women; whilſt that is to be accounted a fruitful tree which yields its product every ſecond or third year, as the Oak and moſt foreſters do: no more may we conclude that any tree or vegetable is deſtitute of ſeeds, becauſe we ſee them not ſo perſpicuouſly with our naked eyes, by reaſon of their exility, as with the niceſt examination of the microſcope.

Another touch at the winds; for though they cannot properly be ſaid to be infirmities of trees, yet they are amongſt the principal cauſes that render trees infirm. I know no ſurer protection againſt them, than, as we ſaid, to ſhelter and ſtake the trees whilſt they are young, till they have well-eſtabliſhed roots; and with this caution, that in caſe any goodly tree (which you would deſire eſpecially to preſerve and redreſs) chance to be proſtrated by ſome impetuous and extraordinary ſtorm, you be not overhaſty to carry him away, or deſpair of him. Firſt then, let me perſuade you to poll him cloſe, and ſo let him lie ſome time; for by this means many vaſt trees have raiſed themſelves by the vigour only of the remaining roots, without any other aſſiſtance; ſo as people have pronounced it miraculous, as I could tell you by ſeveral inſtances, beſides what Theo-

phraſtus relates, lib. v. cap. xix. of that huge Platanus which roſe in one night in his obſervation: And this puts me in mind of what I remember the very learned critic Palmerius affirms of an Oak, ſubverted by a late tempeſt near Breda, (where this old ſoldier militated under Prince Maurice, when the town was beſieged by the famous Marquis Spinola) which tree, after it had lain proſtrate about two months (the ſide-branches pared off) roſe up of itſelf, and flouriſhed as well as ever. Which event was thought ſo extraordinary, that the people reſerved ſprigs and boughs of it, as ſacred reliques; and this he affirms to have ſeen himſelf. I take the more notice of theſe accidents, that none who have trees blown down, where it may cauſe a deformed gap in ſome avenue near their ſeats, may altogether deſpair of their reſurrection, with patience and timely freeing them. And the like to this I find happened in more than one tree near Bononia in Italy, in 1657, when a turbulent guſt almoſt quite eradicated a very large tract of huge Poplars, belonging to the Marchioneſs Elephantucca Spada. Theſe univerſally erected themſelves again, after they were beheaded, though they lay even proſtrate.——Pliny, the Naturaliſt, ſays, *Proſtratas reſtitui plerumque, et quadam terræ cicatrice viveſcere, vulgare eſt. Et familiariſſimum hoc Platanis; quæ plurimum ventorum concipiunt propter denſitatem ramorum: quibus amputatis, levatæ onere in ſua ſcrobe reponuntur. Factumque jam eſt hoc in Juglandibus, Oleiſque, ac multis aliis. Eſt in exemplis, et ſine tempeſtate, ullave cauſa alia quam prodigii, cecidiſſe multas ac ſua ſponte reſurrexiſſe. Factum hoc Populi Rom. Quiritibus oſtentum Cimbricis bellis Nuceriæ in luco Junonis, Ulmo, poſtquam etiam cacumen amputatum erat, quoniam in aram ipſam procumbebat, reſtituta ſponte, ita ut protinus floreret: a quo deinde tempore Majeſtas Populi Romani reſurrexit, quæ ante vaſtata cladibus fuerat. Memoratur hoc idem factum et in Philippis, Salice procidua atque detruncata: et Stagiris et Muſeo populo alba: omnia fauſti ominis Sed maxime mirum, Antandri Platanus etiam circumdolatis latcribus reſtibilis ſponte facta, vitæque reddita longitudine quindecim cubitorum, craſſitudine quatuor ulnarum.* Lib. xvi. cap. xxxii.

But we have farther inſtances than theſe, and ſo very lately as that dreadful ſtorm happening November 26, 1703, when, after ſo many thouſand Oaks and other timber-trees were quite ſubverted, a moſt famous and monſtrous Oak, growing at Epping in Eſſex, (blown down) raiſed itſelf, and withſtood that hurricane. Theſe, amongſt many others, are the infirmities to which foreſt-trees are ſubject whilſt they are ſtanding: and when they are felled they are liable to the worm, eſpecially if cut before the ſap

BOOK II. be perfectly at reſt:——To prevent or cure it in the timber, I commend this ſecret as the moſt approved:

Let common yellow ſulphur be put into a glaſs cucurbit, upon which pour ſo much of the ſtrongeſt aqua fortis, as may cover it three fingers deep: Diſtil this to dryneſs, which is done by two or three rectifications. Let the ſulphur remaining in the bottom (being of a blackiſh or ſad red colour) be laid on a marble, or put into a glaſs, where it will eaſily diſſolve into oil: With this anoint what is either infected, or to be preſerved of timber. It is a great and excellent arcanum for tinging the wood with no unpleaſant colour, by no art to be waſhed out; and ſuch a preſervative of all manner of woods, nay, of many other things, as ropes, cables, fiſhing nets, maſts of ſhips, &c. that it defends them from putrefaction, either in waters under or above the earth, in the ſnow, ice, air, winter or ſummer. It were ſuperfluous to deſcribe the proceſs of the aqua fortis; it ſhall be ſufficient to let you know, that our common copperas makes this aqua fortis well enough for our purpoſe, being drawn over by a retort: and for ſulphur, the iſland of St. Chriſtopher's yields enough (which hardly needs any refining) to furniſh the whole world. This ſecret, for the curious, I thought fit not to omit; though three or four anointings with linſeed-oil has proved very effectual, and is more compendious. It was experimented in a Walnut table, where it deſtroyed millions of worms immediately, and is to be practiſed for tables, tubes, mathematical inſtruments, boxes, bedſteads, chairs, rarities, &c. Oil of walnuts will doubtleſs do the ſame, is ſweeter, and a better varniſh; but above all is commended oil of Cedar, or that of Juniper; whilſt oil of Spike does the cure as effectually as any.

But after all theſe ſweeping plagues and deſtructions inflicted on trees,
* 1683. braving all human remedies, ſuch froſts as not many years * ſince happened, left ſuch marks of their deadly effects, not ſparing the goodlieſt and moſt flouriſhing trees, timber, and other of the ſtouteſt kind, as ſome ages will hardly repair: nay, it was obſerved, that the Oak in particular, counted the moſt valiant and ſturdy of the whole foreſt, was more prejudiced with this exceſſive cold, and the drought of the year enſuing, than any of the moſt nice and tender conſtitution: always here excepting, as to an univerſal ſtrages, the hurricane of Sept. 1703, which begins the epocha of the calamities which have ſince followed, not only by the late tempeſt
* 1705. about Auguſt laſt *, but by that ſurprizing blaſt, accompanied doubtleſs with a fiery ſpirit, which ſmote the moſt flouriſhing foreſters and fruit-

trees, burning their buds and leaves to duſt and powder, not ſparing the very fruit. This being done in a moment, muſt be looked upon as a plague not to be prevented: In the mean time, that the malignity proceed no farther, it may be adviſable to cut and top the ſummities of ſuch tender mural trees, rare ſhrubs, &c. as have moſt ſuffered, and are within reach, rubbing off the ſcorchings in order to new ſpring.

There were, in my remembrance, certain prayers, litanies, and collects, ſolemnly uſed by the pariſh miniſter in the field, at the limits of their perambulations on the rogation days, from an antient and laudable cuſtom of above one thouſand years, introduced by Avitus, the pious Biſhop of Vienna, in a great dearth, unſeaſonable weather, and other calamities, (however in tract of time abuſed by many groſs ſuperſtitions and inſignificant rites, in imitation of the Pagan Robigalia) upon which days, about the aſcenſion and beginning of ſpring eſpecially, prayers were made, as well deprecatory of epidemical evils, amongſt which blaſts and ſmut of corn were none of the leaſt, as ſupplicatory for propitious ſeaſons, and bleſſings on the fruits of the earth. Whether there was any peculiar office, beſides thoſe for Ember-weeks, appointed, I do not know; but the pious and learned Biſhop of Wincheſter, (Andrews) has, in his devotions, left us a prayer ſo appoſite and comprehenſive for theſe emergencies, that I cannot forbear the recital:

REmember, O Lord, to renew the year with thy goodneſs, and the ſeaſon with a promiſing temper; for the eyes of all wait upon thee, O Lord; thou giveſt them meat; thou openeſt thy hand, and filleſt all things living with thy bounty. Vouchſafe therefore, O Lord, the bleſſings of the heavens, and the dews from above: The bleſſings of the ſprings, and the deep from beneath: The returns of the ſun, the conjunctions of the moon: The benefit of the riſing mountains, and the laſting hills: The fulneſs of the earth, and all that breed therein:

A fruitful ſeaſon,
Temperate air,
Plenty of corn,
Abundance of fruits,
Health of body, and
Peaceable times,
Good and wiſe government,
Prudent counſels,
Juſt laws,
Righteous judgments,
Loyal obedience,
Due execution of Juſtice,
Sufficient ſtore for life,
Happy births,
Good and fair plenty,
Breeding and inſtitution of children.

That our ſons may grow up as the young plants, and our daughters may be as the poliſhed corners of the temple: That our garners may be full and plenteous with all manner of ſtore: That our ſheep may bring forth thouſands: That our oxen may be ſtrong to labour: That there be no decay; no leading into captivity; no complaining in our ſtreets: But that every man may ſit under his own vine, and under his own fig-tree, in thankfulneſs to thee; ſobriety, and charity to his neighbour; and in whatſoever other eſtate thou wilt have him, therewith to be contented: And this for Jeſus Chriſt his ſake, to whom be glory for ever. Amen.

Hitherto I have ſpoken of trees, their kinds, and propagation in particular. I ſhall now ſay a word or two concerning their ordering in general, as it relates to Coppices, Lopping, Felling, &c. After this I ſhall add ſomething concerning their uſes as to fuel, &c. and caſt ſuch accidental leſſons into a few aphoriſms as could not well be more regularly inſerted. I ſhall next give ſome ſerious obſervations in reference to the main deſign and project of this diſcourſe, as it concerns the improvement of his Majeſty's Foreſts for the honour and ſecurity of the whole kingdom. And, laſtly, I ſhall put a concluſion to this work with an hiſtorical account of the ſacredneſs and uſe of STANDING GROVES.

DENDROLOGIA.

BOOK THE THIRD.

CHAP. I.

of COPPICES.

CHAP. I.

SYLVA CÆDUA is (as Varro defines it) as well Coppice to cut for fuel as for uſe of timber; and we have already ſhewed how it is to be raiſed, both by ſowing and planting. I ſhall only here add, that if, in their firſt deſignation, they be ſo laid out as to grow for ſeveral falls, they will both prove more profitable and more delightful: More profitable, becauſe of their annual ſucceſſion; and more pleaſant, becauſe there will always remain ſome of them ſtanding; and if they be ſo caſt out, as that you leave ſtraight and even intervals of eighteen or twenty feet for graſs, between ſpring wood and ſpring wood, ſecurely fenced and preſerved, the paſtures will lie both warm, and prove of exceeding delight to the owner. Theſe ſpaces are likewiſe uſeful, and neceſſary for cartway, to fetch out the wood at every fall. There is not a more noble and worthy huſbandry than is this, which rejects no ſort of ground nor ſituation, (though facing the eaſt is eſteemed beſt for both timber and underwood) as we have abundantly ſhewed; ſince even the moſt boggy places may be ſo drained and caſt, as to yield their increaſe by planting the drier ſorts upon the ridges and banks which you caſt up, where they will thrive exceedingly: And then Willow, Sallow, Alder, Poplar, Sycamore, Black Cherry, &c. will ſhoot tolerably well on the lower and more uliginous; with this caution, that for the firſt two years they be kept diligently weeded and cleanſed, which is as neceſſary as fencing and guarding from cattle. Our ordinary coppices are chiefly upon Haſel, or the Birch; but if amongſt the other kinds, ſtore of Aſh, (which I moſt prefer, for a ſpeedy and erect growth) Cheſnut, Sallow, and Sycamore, (at leaſt one in four) were

BOOK III.

ſprinkled in the planting, the profit would ſoon diſcover a difference, and well recompenſe the induſtry. Others adviſe us to plant ſhoots of Sallow, Willow, Alder, and all the ſwift-growing trees, being of ſeven years growth, ſloping off both the ends towards the ground, to the length of a billet, and burying them a reaſonable depth in the earth. This will cauſe them to put forth ſeven or eight branches, each of which will become a tree in a ſhort time, eſpecially if the ſoil be moiſt. The neareſt diſtance for theſe plantations ought never to be leſs than five feet at firſt, ſince every felling renders them wider for the benefit of the timber, even to thirty and forty feet, in five or ſix fellings.

Though it be almoſt impoſſible for us to preſcribe at what age it were beſt huſbandry to fell copſes, (as we at leaſt call beſt huſbandry) that is, for moſt and greateſt gain, ſince the markets, and the kinds of wood, and emergent uſes do ſo much govern; yet copſes are ſometimes of a competent ſtature after eight or nine years from the acorn; and ſo every eight or ten years ſucceſſively, will riſe better and better. But this had need be an extraordinary ground, otherwiſe you may do well to allow them twelve or fifteen to fit them for the ax; but thoſe of twenty years ſtanding are better, and far advance the price, eſpecially if Oak, and Aſh, and Cheſnut be the chief furniture; and be ſure you ſhall loſe nothing by this patience, ſince, all accidents conſidered, the profit ariſing from copſes ſo managed (be the ground almoſt never ſo poor) ſhall equal, if not exceed, what is uſually made by the plow or grazing. Some of our old clergy ſpring-woods heretofore have been let reſt till twenty-five or thirty years, and have proved highly worth the attendance; for by that time, even a ſeminary of acorns will render a conſiderable advance, as I have already exemplified in the Northamptonſhire Lady. And if copſes were ſo divided, as that every year there might be ſome felled, it were a continual and a preſent profit. Seventeen years growth affords a tolerable fell. Suppoſing the copſe of ſeventeen acres, one acre might be yearly felled for ever, and ſo more, according to proportion: but though the ſeldom fall yields the more timber, yet the frequent makes the under-wood the thicker; therefore at ten or twelve years growth, ſays Mr. Cook, make the fall in ſhallow ground, and fourteen in deeper. If many timber-trees grow in your copſes which are to be cut down, fell both them and the under-wood, as near the ground as may be; but this is to be underſtood where the wood is very thick; otherwiſe, it is adviſable to ſtock up the thinner, eſpecially in great timber, and to ſet in the holes Elm, Cherry, Poplar, Sallow,

Service; and ſo theſe trees, which are apt to grow from the running-root, thicken the wood exceedingly; whilſt the very roots will pay for the grubbing, and yield you ſome feet of the beſt timber; whereas being let ſtand, nothing would have grown. If the ground be a ſhallow ſoil, forbear filling the holes quite, but ſet ſome running-wood in the looſened earth, and the ends of the old roots being cut, will furniſh the ſides of the holes ſpeedily. In thin copſes, it is profitable to lay ſome boughs athwart, which will be rooted to advantage againſt next fall. All rotten ſtubs among our under-woods ſhould be extirpated to make way for ſeedlings, and young roots to ſpring and run: The cutting ſlanting, ſmooth and cloſe, is of great importance; and frequent felling gives way and air to the ſubnaſcent ſeedlings, and the reſt will make luſty ſhoots.

As to what numbers and ſcantlings you are to leave on every acre, the ſtatutes are our general guides, at leaſt the legal. It is a very ordinary copſe which will not afford three or four firſts, that is, beſts; fourteen ſeconds, twelve thirds, eight wavers, &c. according to which proportions the ſizes of young trees in copſing are to ſucceed one another. By the Statute of 35 Henry VIII. in copſes, or under-woods, felled at twenty-four years growth, there were to be left twelve ſtandils, or ſtores of Oak, upon each acre; in defect of ſo many Oaks, the ſame number of Elms, Aſh, Aſp, or Beech; and they to be ſuch as are of likely trees for timber, and of ſuch as have been ſpared at ſome former felling, unleſs there were none; in which caſe they are to be *then* left, and ſo to continue without felling, till they are ten inches ſquare within a yard of the ground. Copſes above this growth felled, to leave twelve great Oaks; or in defect of them, other timber-trees, as above, and ſo to be left for twenty years longer, and to be incloſed ſeven years.

In ſum, you are to ſpare as many likely trees for timber as with diſcretion you can. In the mean time, there are ſome who find it not ſo profitable to permit ſo many timber-trees to ſtand in the heart of copſes, but on the ſkirts, and near the edges, where their branches may freely ſpread, and have air, without dripping and annoying the ſubnaſcent crop: nor ſhould they be ſhread, which commonly makes them grow knotty. This is a note of the ingenious Mr. Nourſe.

Now as to the felling, (beginning at one ſide, that the carts may enter without detriment to what you leave ſtanding) the under-wood may be cut

Book III. from January, at the lateſt, till Mid-March or April; or from Mid-September, till near the end of November; ſo as all be avoided by Midſummer at the lateſt, and then fenced, (where the rows and bruſh lie longer unbound, or made up, you endanger the loſs of a ſecond ſpring) and not to ſtay ſo long as uſually they are a-clearing, that the young and the ſeedlings may not ſuffer the leaſt interruption; and if the winter, previous to your felling copſes, you preſerve them well from cattle, it will recompenſe your care.

It is adviſed not to cut off the browſe-wood of Oaks in copſes, but to ſuffer it to fall off, as where trees ſtand very cloſe it uſually does: I do not well comprehend why yet it ſhould be ſpared ſo long.

When you eſpy a cluſter of plants growing as it were all in a bunch, it ſhall ſuffice that you preſerve the faireſt ſapling, cutting all the reſt away. And if it chance to be a Cheſnut, Service, or like profitable tree, clear it from the droppings and incumbrances of other trees, that it may thrive the better: Then, as you paſs along, prune and trim up all the young wavers, covering ſuch roots as lie bare and expoſed, with freſh mould. There are ſome who direct the lopping of young Oaks at a competent diſtance from the ſtem, and that while the wounds are healing, this would advantage the under-wood; but I cannot ſay it would be without prejudice to the timber.

Cut not above half a foot from the ground, nay the clofer the better, and that to the ſouth, ſlope-wiſe, ſtripping up ſuch as you ſpare from their extravagant branches, water-boughs, &c. that hinder the growth of others. Always remember (before you ſo much as enter upon this work) to preſerve ſufficient plaſh-pole about the verge and bounds of the copſe for fence and ſecurity of what you leave; and for this, ſomething leſs than a rod may ſuffice: Then raking your wood clear of ſpray, chips, and all incumbrances, ſhut it up from the cattle; the longer the better.

By the ſtatute, men were bound to incloſe copſes after felling, of or under fourteen years growth, for four years: Thoſe above fourteen years growth, to be ſixteen years incloſed; and for woods in common, a fourth part to be ſhut up; and at felling, the like proportion of great trees to be left, and ſeven years incloſed: This was enlarged by 13 Eliz. Your elder under-woods may be grazed about July: But for a general rule,

newly-weaned calves are the leaſt noxious to newly-cut ſpring-woods, where there is abundance of graſs; and ſome ſay, colts of a year old; but then the calves muſt be driven out at May at fartheſt, though the colts be permitted to ſtay a while longer: but of this, every man's experience will direct him; and ſurely, the later you admit beaſts to graze, the better. For the meaſure of fuel, theſe proportions were to be obſerved.

Statutable billet ſhould hold three feet in length, and ſeven inches and a half in compaſs; *ten* or *fourteen* as they are counted for *one*, *two*, or *three*, &c. A ſtack of wood (which is the boughs and offal of the trees to be converted to charcoal) is four yards long, three feet and a half high, (in ſome places but a yard) and as much over: In other places, the cord is four feet in height, and four feet over; or, to ſpeak more geometrically, a ſolid made up of three dimenſions, four feet high, four feet broad, and eight feet long; the content one hundred and twenty-eight cubic feet. Faggots ought to be a full yard in length, and two feet in circumference, made round, and not flat; for ſo they contain leſs fuel, though appearing equal in the bulk.

In the mean time, it were to be wiſhed that ſome approved experiments were ſedulouſly tried, with the advice of ſkilful and ingenious phyſicians, for the making of beer without hops; as poſſibly with the White Marrubium, a plant of ſingular virtue, or with dried Heath-tops, viz. that ſort which bears no berries, or the like, far more wholeſome, and leſs bitter than either Tamariſk, Carduus, or Broom, which divers have eſſayed; it might prove a means to ſave a world of fuel, and in divers places young timber and copſe-wood, which is yearly ſpent for poles, eſpecially in countries where wood is very precious *.——Note, That the woodland meaſure, by ſtatute, is computed after eighteen feet the perch.

NOTES.

* Hops were introduced, about two centuries and a half ago, from Flanders, and from that time have been aſſiduouſly cultivated in this kingdom. The duties ariſing from this article are ſo conſiderable, that all public brewers are enjoined under a ſevere penalty to uſe no other bitter for their malt liquors. In a year of moderate fertility, an acre of hops is ſuppoſed to produce ten hundred weight, which may be eſtimated at three pounds per hundred. Of this ſum, one moiety goes clear into the pocket of the cultivator, and the other moiety is employed in the diſcharge of rent, tithe, and all other expences, except the duty by exciſe. It is computed that the duty, upon an average, amounts to 55,000l. per Ann. a ſum too conſiderable to be loſt by permitting other bitter herbs to be ſubſtituted in the place of hops.

CHAP. II.

Of PRUNING.

Book III. THERE can nothing certainly be more neceſſary, in order to pruning, than the knowledge of the courſe and nature of the ſap, which not being as yet ſo univerſally agreed on, after innumerable trials and experiments, leads our arborators into many errors and miſtakes. I have in this foreſt-work occaſionally recited the various opinions of ſeveral, leaving them to the determination of the learned and judicious, as a conſiderable part of natural philoſophy; Dr. Grew, Malpighius, De la Quinteny, and what is found diſperſed in the philoſophical tranſactions by our plant-anatomiſts; without charging this chapter with repetitions. And the ſame I have done likewiſe as to aſtrological obſervations, poſitions of the ſtars, and planetary configurations, exhalations, and dominant power; though, in compliance to cuſtom, I now and then forbear to abdicate our country planter's goddeſs; contenting myſelf with the wholeſomeneſs of the air we breathe in, and the goodneſs of the ſoil. I ſhall therefore, in the firſt place, ſpeak of the manual operation of pruning, and other inſtructions as they afterwards occur.

PUTATIO, or Pruning, is the purgation of trees in general from what is ſuperfluous. The antients found ſuch benefit in pruning, that they feigned a goddeſs preſided over it, as Arnobius tells us: and, in truth, it is in the diſcreet performance of this work, that the improvement of our timber and woods does as much conſiſt as in any thing whatſoever. A ſkilful planter ſhould therefore be early at this work.

It is a miſery to ſee how our faireſt trees are defaced and mangled by unſkilful wood-men, and miſchievous borderers, who go always armed with ſhort hand-bills, hacking and chopping off all that comes in their way; by which our trees are made full of knots, ſtubs, boils, cankers, and deformed bunches, to their utter deſtruction. Good huſbands ſhould be aſhamed of it; tho' I would have no wood-man pretend to be without all his neceſſary furniture, when he goes about this work; which I, once for all, reckon to be the hand-bill, hatchet, hook, hand-ſaw, an excellent pruning-knife, broad chiſel and mallet, all made of the beſt ſteel and kept ſharp; and thus he is provided for greater, or more gentle executions,

purgations, reciſions, and coercions; and it is of main concern, that the proper and effectual tool be applied to every work, ſince heavy and rude inſtruments do but mangle and bruiſe tender plants; and if they be too ſmall, they cannot make clear and even work upon great arms and branches. The knife is for twigs and ſpray; the chiſel for larger arms, and ſuch amputations as the ax and bill cannot well operate upon. As much to be reprehended are thoſe who either begin this work at unſeaſonable times, or ſo maim the poor branches, that either out of lazineſs, or want of ſkill, they leave moſt of them ſtubs, and inſtead of cutting the arms and branches cloſe to the bole, hack them off a foot or two from the body of the tree, by which means they become hollow and rotten, and are as ſo many conduits to receive the rain and the weather, which conveys the wet to the very matrix and heart, deforming the whole tree with many ugly botches, which ſhortens its life, and utterly mars the timber: I know Sir H. Platt tells us, the Elm ſhould be ſo lopped, but he ſays it not of his own experience, as I do. And here it is that I am, once for all, to warn our diſorderly huſbandmen from coveting to let their lops grow to an extraordinary ſize before they take them off, as conceiving it furniſhes them with the more wood for the fire; not conſidering how ſuch gaſtly wounds mortally affect the whole body of the tree, or at leaſt do ſo decay their vigour, that they hereby loſe more in one year than the lop amounts to, ſhould they pare them off ſooner, and when the ſcars might be covered: In the mean while that young Oaks proſper much in growth, by timely pruning, the induſtrious Mr. Cook obſerves; whereas ſome other trees, as the Hornbeam, &c. though they will bear conſiderable lops, when there is only the ſhell of the tree ſtanding, yet it is much to its detriment, eſpecially to the Aſh, which if once it comes to take wet by this means, rarely produces more lop to any purpoſe; above all, if it decay in the middle, it is then fitter for the chimney, than to ſtand and cumber the ground: The ſame may be pronounced of moſt trees, which would not perhaps become dotards in many ages, but for this covetous barbarity and unſkilful handling.

By this animadverſion alone it were eaſy for an ingenious man to underſtand how trees are to be governed; which is, in a word, by ſparing great lops, cutting clean, ſmooth and cloſe, making the ſtroke upward, and with a ſharp bill, ſo as the weight of an untractable bough do not ſplice and carry the bark with it, which is both dangerous and unſightly. The Oak will ſuffer itſelf to be made a Pollard; that is, to have its head quite cut

Book III. off, and it may be good for maſt, if not too much pruned, but not for timber: but the Elm ſo treated will periſh to the foot, and certainly become hollow at laſt, if it eſcape with life.

The proper ſeaſon for this work is; for old trees earlier, for young later, as a little after the change in January or February; ſome ſay in December, the wind in a gentle quarter:

——Tum ſtringe comas, tum brachia tonde:
——Tum denique dura
Exerce imperia, et ramos compeſce fluentes. Georg. ii.

But this ought not to be too much in young fruit-trees, after they once come to form a handſome head; in which period you ſhould but once pare them over about March, to cover the ſtock the ſooner, if the tree be very choice. To the aged, this is plainly a renewing of their youth, and an extraordinary refreſhment, if taken in time, and that their arms be not ſuffered to grow too great and large; in which caſe the member muſt not be amputated too near the body, but at ſome diſtance——*ne pars ſincera trahatur:* and remember to cut ſmooth, and ſloping upwards, if upright boughs, otherwiſe downwards; and be ſure to emplaiſter great wounds to keep out the wet, and haſten the covering of the bark: beſides, for Interlucation, remove exuberant branches, *& ſpiſſæ nemorum comæ*, where the boughs grow too thick and are cumberſome, to let in the ſun and air. This is of great importance; and ſo is the aſſiduous taking away of ſuckers, water-boughs, fretters, &c. and for the benefit of tall timber, the due ſtripping up the branches, and rubbing off the buds to the heights you require. Yet ſome do totally forbear the Oak, eſpecially if aged, obſerving that they much exceed in growth ſuch as are pruned; and in truth, ſuch trees as we would leave for ſhade and ornament, ſhould be ſeldom cut, but the brouſe-wood cheriſhed and preſerved as low towards the ground as may be, for a more venerable and ſolemn ſhade; and therefore I did much prefer the walk of Elms in St. James's Park, as it lately grew branchy, intermingling their reverend treſſes, before the preſent trimming them up ſo high; eſpecially, ſince I fear the remedy comes too late to ſave their decay (could it have been avoided) if the amputations of ſuch over-grown parts as have been cut off, ſhould not rather accelerate it, by expoſing their large and many wounds to the injuries of the weather, which will endanger the rotting of them, beyond all that can be applied by tar, or otherwiſe,

to protect them. I do rather conceive their infirmities to proceed from what has not long ſince been abated of their large ſpreading branches, to accommodate with the mall; as any one may conjecture by the great impreſſion which the wet has already made in thoſe incurable ſcars, that being now multiplied, muſt needs the ſooner impair them; the roots having likewiſe infinitely ſuffered by many diſturbances about them. In all events this walk might have enjoyed its goodly canopy, with all their branchy furniture for ſome ages to come, for it is hardly one ſince firſt they were planted: But this defect is providently and nobly ſupplied by their ſucceſſors the Lime trees, which will ſooner accompliſh their perfection, by taking away the Cheſnut trees, which will elſe do them prejudice.

But it is now, and never till now, that thoſe walks and ranks of trees, and other royal amenities, are ſure to proſper, whilſt they are entirely under the care and culture of the moſt induſtrious and knowing Mr. Wiſe, to whom, and to his partner Mr. London, I not only acknowledge myſelf particularly obliged, but the whole nation, for what they have contributed to the ſweeteſt, moſt uſeful, and moſt innocent diverſions of life, gardens and plantations.

One ſhould be cautious in heading timber-trees, eſpecially the pithy, unleſs where they grow very crooked; in which caſe abate the head with an upward ſlope, and cheriſh a leading ſhoot. The Beech is very tender of its head.

It is by the diſcreet leaving the ſide-boughs in convenient places, ſparing the ſmaller, and taking away the bigger, that you may advance a tree to what determined height you deſire: Thus, bring up the leader, and when you would have that ſpread and break out, cut off all the ſide-boughs, and eſpecially at Midſummer, if you eſpy them breaking out. Young trees may every year be pruned, and as they grow older at longer intervals, as at three, five, ſeven, or ſooner, that the wounds may recover, and nothing be deformed.

Evergreens do not well ſupport to be decapitated; ſide-boughs they freely ſpare in April, and during the ſpring; and if you cut at firſt two or three inches from the body, and the next ſpring after cloſe to the ſtem,

BOOK III. covering the wounds with wax, or well-tempered clay, the moſt tender may ſuffer ſuch amputations without prejudice.

Note, That the ſide and collateral branches of the Fir cut, or broken off, ſpring no more; and though the tops ſometimes do, yet they never proſper to beautiful and erect heads, in which conſiſts the grace of that beautiful tree.

Another caution is, that you be ſure to cut off ſuch tender branches to the quick, which you find have been cropt by goats, or any other cattle, who leave a drivel where they bite; which not only infects the branches, but ſometimes endangers the whole; the reaſon is, for that the natural ſap's recourſe to the ſtem, communicates the venom to all the reſt, as the whole maſs and habit of animal blood is by a gangrene or venereal taint.

Divers other precepts of this nature I could here enumerate, had not the great experience, faithful and accurate deſcription how this neceſſary work is to be performed, ſet down by our countryman honeſt Lawſon, prevented all that the moſt inquiſitive can ſuggeſt: The particulars are ſo ingenious and highly material, that you will not be diſpleaſed to read them in his own ſtyle and character. *

All ages, ſaith he, by rules and experience do conſent to a pruning and lopping of trees; yet have not any that I know deſcribed unto us (except in dark and general words) what, or which are thoſe ſuperfluous boughs which we muſt take away; and that is the moſt chief end and needful point to be known in lopping: And we may well aſſure ourſelves (as in all other arts, ſo in this) there is a vantage and dexterity by ſkill; an habit by practice out of experience, in the performance hereof, for the profit of mankind: Yet do I not know (let me ſpeak it with patience of our cunning Arboriſts) any thing within the compaſs of human affairs ſo neceſſary, and ſo little regarded; not only in orchards, but alſo in all other timber-trees, where or whatſoever.

NOTES.

* Lawſon's Book is intitled, *A New Orchard and Garden*; it was publiſhed in 1597. Another Edition appeared in 1623.

CHAP. II.

Now to our purpoſe:

How many foreſts and woods, wherein you ſhall have for one lively thriving tree, four (nay ſometimes twenty-four) evil-thriving, rotten, and dying trees, even whiles they live; and inſtead of trees, thouſands of buſhes and ſhrubs! what rottenneſs! what hollowneſs! what dead arms! withered tops! curtailed trunks! what loads of moſs! drooping boughs and dying branches ſhall you ſee every where! and thoſe that in this ſort are in a manner all unprofitable boughs, cankered arms, crooked, little, and ſhort boals. What an infinite number of buſhes, ſhrubs, and ſcrags of Haſels, Thorns, and other unprofitable wood, which might be brought by dreſſing to become great and goodly trees! Conſider now the cauſe.

The leſſer wood hath been ſpoiled with careleſs, unskilful, and untimely ſowing; and much alſo of the great wood. The greater trees at the firſt riſing have filled and overladen themſelves with a number of waſtful boughs and ſuckers, which have not only drawn the ſap from the boal, but alſo have made it knotty, and themſelves, and the boal moſſy, for want of dreſſing; wherefore, if in the prime of growth, they had been taken away cloſe, all but one top, and clean by the bulk, the ſtrength of all the ſap ſhould have gone to the bulk, and ſo he would have recovered and covered his knots, and have put forth a fair, long, and ſtreight body, for timber profitable, huge, great of bulk, and of infinite laſt.

If all Timber-trees were ſuch, (will ſome ſay) How ſhould we have crooked wood for wheels, coorbs, &c.

Anſw. Dreſs all you can, and there will be enough crooked for thoſe uſes.

More than this, in moſt places they grow ſo thick, that neither themſelves, nor earth, nor any thing under or near them can thrive; nor Sun, nor Rain, nor Air can do them, nor any thing near, or under them, any profit or comfort.

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I ſee a number of hags, where out of one root you ſhall ſee three or four (nay more, ſuch is mens unskilful greedineſs, who, deſiring many, have none good) pretty Oaks, or Aſhes, ſtreight and tall; becauſe the root at the firſt ſhoot gives ſap amain: But if one only of them might be ſuffered to grow, and that well and cleanly pruned, all to his very top, what a tree ſhould we have in time? And we ſee by thoſe roots continually and plentifully ſpringing, notwithſtanding ſo deadly wounded, what a commodity ſhould ariſe to the owner, and the commonwealth, if wood were cheriſhed and orderly dreſſed. The waſte boughs cloſely and skilfully taken away, would give us ſtore of fences and fuel; and the bulk of the tree in time would grow of huge length and bigneſs: But here, methinks, I hear an unskilful Arboriſt ſay, that trees have their ſeveral forms, even by nature; the Pear, the Holly, the Aſp, &c. grow long in bulk, with few and little arms: The Oak by nature broad, and ſuch like. All this I grant: But grant me alſo, that there is a profitable end and uſe of every tree, from which if it decline, though by nature, yet man by art may, nay muſt, correct it. No other end of trees I never could learn, than good timber, fruit much and good, and pleaſure: Uſes phyſical hinder nothing a good form.

Neither let any man ever ſo much as think, that it is unprofitable, much leſs unpoſſible, to reform any tree of what kind ſoever: For, believe me, I have tried it: I can bring any tree (beginning betime) to any form. The Pear and Holly may be made to ſpread, and the Oak to cloſe.

Thus far the good man out of his eight and forty years experience concerning timber-trees: He deſcends then to the orchards; which, becauſe it may likewiſe be acceptable to our induſtrious planter, I thus contract.

"Such as ſtand for fruits ſhould be parted from within two feet, or thereabouts, of the earth; ſo high, as to give liberty to dreſs the root, and no higher; becauſe of exhauſting the ſap that ſhould feed his fruit; for the

bole will be firſt, and beſt ſerved and fed, being next to the root, and of greateſt ſubſtance. Theſe ſhould be parted in two, three, or four arms, as your graffs yield twigs; and every arm into two or more branches, every branch into his ſeveral cyons; ſtill ſpreading by equal degrees, ſo as his loweſt ſpray be hardly without the reach of a man's hand, and his higheſt not paſt two yards higher: That no twig (eſpecially in the midſt) touch his fellow; let him ſpread as far as his liſt, without any maſter-bough, or top, equally; and when any fall lower than his fellows, (as they will with weight of fruit) eaſe him the next ſpring of his ſuperfluous twigs, and he will riſe: When any mount above the reſt, top him with a nip between your fingers, or with a knife: Thus reform any cyon; and as your tree grows in ſtature and ſtrength, ſo let him riſe with his tops but ſlowly and eaſily, eſpecially in the midſt, and equally in breadth alſo, following him upward, with lopping his under-growth and water-boughs, keeping the ſame diſtance of two yards, not above three in any wiſe, betwixt the loweſt and higheſt twigs.

"Thus ſhall you have handſome, clear, healthful, great, and laſting trees.

"Thus will they grow ſafe from winds, yet the top ſpreading.

"Thus ſhall they bear much fruit; I dare ſay, one as much as five of our common trees, all his branches loaden.

"Thus ſhall your bole, being low, defraud the branches but little of their ſap.

"Thus ſhall your trees be eaſy to dreſs, and as eaſy to gather the fruit from, without bruiſing the cyons, &c."

The fitteſt time of the moon for the pruning is (as of graffing) when the ſap is ready to ſtir, not proudly ſtirring, and ſo to cover the wound; and here, for the time of day, we may take Columella, *frondem medio die arbo-rator ne cædito*, Lib. xi. Old trees ſhould be pruned before young plants; and note, that whereſoever you take any thing away, the ſap the next ſummer will be putting; be ſure therefore when he puts to bud in any unfit place, you rub it off with your finger; and if this be done for three or four years at Midſummer, it will at laſt wholly clear the ſide-boughs;

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and exalt the growth of the ſtem exceedingly; and this is of good uſe for Elms, and ſuch trees as are continually putting forth where they have been pruned. Thus begin timely with your trees, and you may bring them to what form you pleaſe. If you deſire any tree ſhould be taller, let him break or divide higher: This for young trees. The old are reformed by curing of their diſeaſes, of which we have already diſcourſed. There is this only to be conſidered, in reference to foreſters, out of what he has ſpoken concerning fruit-trees; that (as has been touched) where trees are planted for ſhadow and mere ornament, as in walks and avenues, the Brouſe-wood, as they call it, ſhould moſt of it be cheriſhed; whereas in fruit and timber-trees, Oak excepted, it is beſt to free them of it. As for Pollards, (to which I am no great friend, becauſe it makes ſo many ſcrags and dwarfs of many trees, which would elſe be good timber, endangering them with drips, and the like injuries) they ſhould not be headed above once in ten or twelve years, at the beginning of the ſpring, or end of the fall: And Note, that all coppicing and cutting cloſe invigorates the roots and the ſtem of whatſoever grows weak and unkindly; but you muſt then take care it be not overgrown with weeds or graſs. Nothing, ſays my Lord Bacon, (Exper. 586) cauſes trees to laſt ſo long, as the frequent cutting; every ſuch diminution is a re-invigoration of the plant's juice, ſo that it neither goes too far, nor riſes too faintly, when it is timely refreſhed with this remedy; and therefore we ſee that the moſt antient trees in church-yards, and about old buildings, are either Pollards or Dotards, ſeldom ariſing to their full altitude. It is true, as Mr. Nourſe obſerves, that Elm and Oak frequently pollarded and cut, hindering their mounting, increaſes the bulk and circumference, and makes a ſhew of ſubſtance, when all the while it is but a hollow trunk, filled with its own corruption, ſpending the genuine moiſture which ſhould go to the growth of the arms and head, and interior ſubſtance of uſeful timber.

For the improvement of the ſpeedy growth of trees, there is not a more excellent thing than the frequent rubbing of the bole or ſtem with ſome piece of hair-cloth, or ruder ſtuff, at the beginning of ſpring: Some I have known done with ſeal's ſkin; the more rugged bark with a piece of coat of mail, which is made of ſmall wires: This done when the body of the tree is wet, as after a ſoaking rain, yet ſo as not to excorticate, or gall the tree, has exceedingly accelerated its growth (I am aſſured, to a wonderful and incredible improvement) by opening the pores, freeing them of moſs, and killing the worm.

Laſtly, frondation, or the taking off ſome of the luxuriant branches and ſprays of ſuch trees, eſpecially whoſe leaves are profitable for cattle, is a kind of pruning: and ſo is the ſcarrifying and croſs hatching of ſome fruit-bearers, and others, to abate that φυλλομανία, which ſpends all the juice in the leaves, to the prejudice of the reſt of the parts.

But after all this, let us hear what the learned and experienced 'Squire Brotherton has obſerved upon this article of pruning, and particularly of the taking off the top: That thoſe trees which were ſo uſed, ſome years before the ſevere froſt of 1684, died; thoſe not ſo pruned, eſcaped: And of other trees (having but a ſmall head left) the reſt of the boughs cleared, the tops flouriſhed, and the looſe branches ſhread periſhed, and the unpruned eſcaped: Moreover, when the like pruning was tried on trees twenty feet high, the difference of the increaſe was viſible the following ſummer; but within ſeven or eight years time the difference was exceeding great, and even prodigious, both in bark and branch, beyond thoſe trees that had been pruned.

This, and the like, belonging to the care of the Wood-ward, will mind him of his continual duty; which is to walk about and ſurvey his young plantations daily; and to ſee that all gaps be immediately ſtopped; treſpaſſing cattle impounded; and (where they are infeſted) the deer chaſed out, &c. It is moſt certain that trees, preſerved and governed by this diſcipline, and according to the rules mentioned, would increaſe the beauty of foreſts, and value of timber, more in ten or twelve years, than all other imaginable plantations (accompanied with our uſual neglect) can do in forty or fifty.

To conclude: In the time of this work, our ingenious Arborator ſhould frequently incorporate, mingle, and unite the arms and branches of ſome young and flexible trees, which grow in conſort, and near to one another, by entring them into their mutual barks with a convenient inciſion: this, eſpecially about fields and hedge-rows, for fence and ornament. Dr. Plot mentions ſome that do naturally, or rather indeed accidentally, mingle thus; nay, and ſo embrace and coaleſce, as if they iſſued out of the bowels of one another: Such are two Beeches in the way from Oxford to Reading at Cain-End; the bodies of which trees ſpringing from different roots, after they have aſcended parallel to the top, ſtrangely unite together a great height from the ground, a tranſverſe piece of timber entering at each end the

BOOK III. bodies of the trees, and growing jointly with them: The ſame is ſeen in Sycamores at New-College Gardens. I myſelf have woven young Aſh-poles into twiſts of three and four braids, like women's hair, when they make it up to fillet it under their coifs, which have ſtrangely incorporated and grown together without ſeparation; but theſe are rather for curioſity, than of advantage for timber.

Trees will likewiſe grow frequently out of the bole of the other; and ſome roots will penetrate through the whole length of the trunk, till, faſtening in the very earth, they burſt the including tree, as it has happened in Willows, where an Aſh tree has ſprung likely from ſome key or ſeed dropt upon the rotten head of it: But this accident not ſo properly pertaining to this chapter, I conclude with recommending the bowing and bending of young timber-trees, eſpecially Oak and Aſh, into various flexures, curbs, and poſtures, which may be done by humbling and binding them down with tough bands and withs, or hooks rather, cut ſkrew-wiſe, or ſlightly haggled and indented with a knife, and ſo ſkrewed into the ground, or by hanging of weighty ſtones to the tops, or branches, till the tenor of the ſap, and cuſtom of being ſo conſtrained, do render them apt to grow ſo of themſelves, without power of redreſſing. This courſe would wonderfully accommodate materials for knee-timber and ſhipping, the wheel-wright, and other uſes; conform it to their moulds, ſave infinite labour, and abbreviate the work of hewing and waſte:

——— adeo in teneris conſueſcere multum eſt.

Virgil, it ſeems, knew it well, and for what purpoſe:

Continuò in ſilvis magna vi flexa domatur
In burim, et curvi formam accipit Ulmus aratri. GEORG. ii.

When in the woods with mighty force they bow
The Elm, and ſhape it to the crooked plow.

CHAP. III.

Of the AGE, STATURE, *and* FELLING *of* TREES.

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AGE.

THE age of trees, except of the Coniferous, (for the moſt part known by the degrees of their tapering branches) is vulgarly reckoned by the number of ſolar revolutions, or circles; the former bark being digeſted and compacted into a lignous and woody ſubſtance, is annually inveſted by a ſucceeding bark, which yet in ſome trees is not finiſhed ſo ſoon as in others, as we find in the Oak, Elm, Pine, Plumb-tree, &c. which exceed one another in growth, however co-equal in years: But of this hereafter. In the mean time, it is not till a tree is arrived to his perfect age and full vigour, that the Lord of the foreſt ſhould conſult or determine concerning a felling; for there is certainly in trees, as in all things elſe, a time of increment or growth; a ſtatus or ſeaſon when they are at beſt, (which is alſo that of felling) and a decrement or period when they decay. To the firſt of theſe they proceed with more or leſs velocity, as they conſiſt of more ſtrict and compacted particles, or are of a ſlighter and more lax contexture, by which they receive a ſpeedier or ſlower defluxion of aliment. This is apparent in Box and Willow; the one of a harder, the other of a more tender ſubſtance; but as they proceed, ſo they likewiſe continue. By the ſtate of trees I would ſignify their utmoſt effort, growth, and maturity, which are all of them different as to time and kind; yet do not I intend by this any period or inſtant in which they do not continually either improve or decay, (the end of one being ſtill the beginning of the other) but farther than which their natures do not extend; but immediately (though to our ſenſes imperceptible) through ſome infirmity (to which all ſublunary things are obnoxious) dwindle and impair, either through age, defect of nouriſhment, by ſickneſs, and decay of principal parts; but eſpecially, and more inevitably, when violently invaded by mortal and incurable infirmities, or by what other extinction of their vegetative heat, ſubſtraction or obſtruction of air and moiſture; which making all motions whatſoever to ceaſe and determine, is the cauſe of their final deſtruction.

Our honeſt countryman, to whoſe experience we have been obliged for ſomething I have lately animadverted concerning the pruning of trees,

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does, in another chapter of the ſame treatiſe, ſpeak of the age of trees. The diſcourſe is both learned, rational, and full of encouragement; for he does not ſcruple to affirm, that even ſome fruit-trees may poſſibly arrive to a thouſand years of age; and if ſo fruit-trees, (whoſe continual bearing does ſo much impair and ſhorten their lives, as we ſee it does their form and beauty,) how much longer might we reaſonably imagine ſome hardy and ſlow-growing foreſt-trees may probably laſt? I remember Pliny tells us of ſome Oaks growing in his time in the * Hercynian foreſt, which were thought coevous with the world itſelf; their roots had even raiſed mountains, and where they encountered, ſwelled into goodly arches like the gates of a city: But our more modern author's calculation for fruit-trees, (I ſuppoſe he means pears, apples, &c.) his allowance is three hundred years for growth, as much as for their ſtand, as he terms it, and three hundred for their decay, which does in the total amount to no leſs than nine hundred years. This conjecture is deduced from Apple trees growing in his orchard, which having known for forty years, and upon diligent enquiry of ſundry aged perſons, of eighty years and more, who remembered them trees all their time, he finds, by comparing their growth with others of that kind, to be far ſhort in bigneſs and perfection, viz. by more than two parts of three, yea, albeit thoſe other trees have been much hindered in their ſtature through ill government and miſordering: And this to me ſeems not at all extravagant, ſince I find mention of a Pear tree near Roſs, in Herefordſhire, which being of no leſs than eighteen feet in circumference, and yielding ſeven hogſheads of cyder yearly, muſt needs have been of very long ſtanding and age, though perhaps not ſo near Methuſalem's.

To eſtabliſh this, he aſſembles many arguments from the age of animals, whoſe ſtate and decay double the time of their increaſe by the ſame proportion. "If then (ſaith he) thoſe frail creatures, whoſe bodies are nothing in a manner but a tender rottenneſs, may live to that age, I ſee not but a tree of a ſolid ſubſtance, not damnified by heat or cold, capable of, and ſubject to any kind of ordering or dreſſing, feeding naturally, and from the beginning diſburthened of all ſuperfluities, eaſed of, and of

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* Hercyniæ Silvæ roborum vaſtitas intacta ævis, & congenita mundo, prope immortali ſorte miracula excedit. Conſtat attolli colles occurſantium inter ſe radicum repercuſſu: aut ubi ſecuta tellus non fit, arcus ad ramos uſque, et ipſos inter ſe rixantes, curvari portarum patentium modo, ut turmas equitum tranſmittant. Plin. l. xvi. c. ii.

his own accord avoiding the cauſes that may annoy him, ſhould exceed the life of other creatures by very many years. What elſe are trees in compariſon with the earth, but as hairs to the body of man? And it is certain, that (without ſome diſtemper, or forcible cauſe) the hairs dure with the body, and are eſteemed excrements but from their ſuperfluous growth." So as he reſolves, upon good reaſon, that fruit-trees well ordered may live a thouſand years and bear fruit; and the longer the more, the greater and the better; (for which an inſtance alſo in Dr. Beal's Herefordſhire Orchards, p. 21, 22.) becauſe his vigor is proud and ſtronger when his years are many. "Thus you ſhall ſee old trees put forth their buds and bloſſoms both ſooner, and more plentifully than young trees by much; and I ſenſibly perceive my young trees to enlarge their fruit as they grow greater. And if fruit-trees continue to this age, how many ages is it to be ſuppoſed ſtrong and huge timber-trees will laſt; whoſe maſſy bodies require the years of divers Methuſalahs, before they determine their days; whoſe ſap is ſtrong and bitter; whoſe bark is hard and thick, and their ſubſtance ſolid and ſtiff; all which are defences of health and long life? Their ſtrength withſtands all forcible winds; their ſap of that quality is not ſubject to worms and tainting; their bark receives ſeldom or never by caſualty any wound; and not only ſo, but they are free from removals, which are the death of millions of trees; whereas the fruit-tree, in compariſon, is little, and frequently blown down; his ſap ſweet, eaſily and ſoon tainted; his bark tender, and ſoon wounded; and himſelf uſed by man as man uſes himſelf; that is, either unſkilfully or careleſsly." Thus he. But Voſſius de Theolog. Gent. lib. v. cap. v. gives too little age to Aſhes when he ſpeaks but of one hundred years, (in which, as in the reſt, he ſeems to agree with my Lord Bacon, Hiſt. Vitæ et Mort. Art. i.) and to the Medica, Pyrus, Prunus, Cornus, but ſixty. He had as good have held his peace; even Roſemary has laſted amongſt us a hundred years.

I might to this add much more, and truly with ſufficient probability, that timber-trees (eſpecially ſuch as be of a compact, reſinous, or balſamical nature, of which kind are the Yew, Box, Hornbeam, White Thorn, Oak, Walnut, Cedar, Juniper, &c.) are capable of very long duration and continuance. Thoſe of largeſt roots, (a ſign of age) are longer lived than the ſhorter; the dry than the wet; and the gummy, than the watery; the ſterile, than the fruitful: I do not conclude from

Book III. Pliny's Hercynian Oaks, or the Turpentine tree of Idumæa, which Joſephus ranks alſo with the creation. I mentioned a Cypreſs, yet remaining ſomewhere in Perſia near an old ſepulchre, whoſe ſtem is as large as five men can encompaſs, the boughs extending fifteen paces every way; this muſt needs be a very old tree, believed by my author little leſs than two thouſand five hundred years of age. Of ſuch another, Dr. Spon, in his voyage into Greece, ſpeaks, which by its ſpreading ſeems to be of the Savine kind; and, in truth, as to the age and duration, Cypreſs, Cedar, Box, Ebony, Braſil, and other exceeding hard and compact (with ſome reſinous) woods, growing chiefly in both Eaſt and Weſt-Indies, muſt needs be of wonderful age. The particulars were too long to recount of the old Platanus ſet by Agamemnon, mentioned by Theophraſtus, the Herculean Oaks, the Laurel near Hippocrene, the Vatican Ilex, and the Vine which was grown to that bulk and woodineſs as to make a ſtatue of Jupiter, and columns in Juno's temple; at preſent it is found that the great doors of the cathedral at Ravenna are made of ſuch Vine-tree planks, ſome of which are twelve feet long, and fifteen inches broad, the whole ſoil of that country producing Vines of prodigious growth. Such another, in Margiana, is ſpoken of by Strabo, that was twelve feet in circumference. Pliny mentions one of ſix hundred years old in his time; and at Ecoan, the late Duke of Montmorancy's Houſe, is a table of a very large dimenſion, made of the like plant; and that which renders it the more ſtrange, is, that a tree growing in ſuch a wreathed and twiſted manner, rather like a rope than timber, and needing the ſupport of others, ſhould arrive to ſuch a bulk and firm conſiſtence; but ſo it is, and Olearius affirms, that he found many Vines near the Caſpian Sea, whoſe trunks were as big about as a man. And the old Lotus-trees, recorded by Valerius Maximus, and the Quercus Mariana, celebrated by the Prince of Orators, Pliny's huge Larix, and what grew in the Fortunate Iſlands, with that enormous tree Scaliger reports was growing in the Troglodytic India, were famous for their age. St. Hierom affirms he ſaw the Sycamore that Zaccheus climbed up to behold our Lord ride in triumph to Jeruſalem: But that's nothing for age to the Olive under which our bleſſed Saviour agonized, ſtill remaining, as they ſay, in the garden to which he uſed to reſort. At the ſame rate, Surius tells of other Olive trees at Nazareth, and of the curſed Fig-tree, whoſe ſtump was remaining above fifteen hundred years. Not to omit that other Fig-tree, yet ſtanding near Cairo, which is ſaid to have opened in two parts to receive and protect the bleſſed Virgin and holy Babe, as ſhe was flying into Egypt; but is

now ſhewed whole again, as Monconys, who ſaw it, but believed nothing of it, tells the ſtory. There is yet there a tree of the ſame kind, which meaſures ſeventeen paces in circumference. And now in the Aventine Mount they ſhew us the Malus Medica, planted by the hand of St. Dominic, and another in the monaſtery at Fundi, where Thomas Aquinas lived, planted by that Saint, 1278. In Congo they ſpeak of trees capable to be excavated into veſſels, that would contain two hundred men a-piece. To which add thoſe ſuperannuated Tilias now at Baſil, and that of Auſpurg, under whoſe prodigious ſhade they ſo often feaſt, and celebrate their weddings; becauſe they are all of them noted for their reverend antiquity, that of Baſil branching out one hundred paces diameter, from a ſtem of about twenty feet in circle, under which the German Emperors have ſometimes eaten; and to ſuch trees it ſeems they paid divine honours, as the neareſt emblems of eternity, *et tanquam ſacras ex vetuſtate*, as Quintilian ſpeaks. And like to theſe might that Cypreſs be which is celebrated by Virgil, near to another monument.

But we will ſpare our reader, and refer him that has a deſire to multiply examples of this kind, to thoſe undoubted records our Naturaliſt mentions in lib. xvi. chap. xliv. where he ſhall read of Scipio Africanus's Olive trees; Diana's Lotus; the Ruminal Fig tree, under which the bitch wolf ſuckled the founder of Rome and his brother, laſting (as Tacitus calculated) eight hundred and forty years, putting out new ſhoots, and preſaging the tranſlation of that Empire from the Cæſarian line, happening in Nero's reign: The Ilex, of prodigious antiquity, as the Hetruſcian Inſcription remaining on it imported. But Pauſanias, in his Arcadics, thinks the Samian Vitex, of which already, to be one of the oldeſt trees growing, and the Platan ſet by Menelaus: to theſe he adds the Delian Palm, coevous with Apollo himſelf, and the Olive planted by Minerva, according to their tradition; the over-grown Myrtil; the Vatican and Tiburtine Holm, and eſpecially that near to Tuſculum, whoſe body was thirty-five feet about; beſides divers others which he there enumerates in a large chapter. And what ſhall we conjecture of the age of Xerxes's Platanus, in admiration whereof he ſtaid the march of ſo many hundred thouſand men for ſo many days, by which the wife Socrates was uſed to ſwear. And certainly a goodly tree was a powerful attractive, when that prudent Conſul, Paſſienus Criſpus, fell in love with a prodigious Beech of a wonderful age and ſtature (which he uſed to ſleep under, and would ſometimes refreſh it with pouring wine at the roots) and that wife Prince

BOOK III. Francis I. with an huge Oak, which he cauſed to be ſo curiouſly immured at Bourges.

STATURE. We have already made mention of Tiberius's Larch, intended to be employed about the Naumachia, which being one hundred and twenty feet in length, bare two feet diameter all that ſpace, (not counting the top) and was looked upon as ſuch a wonder, that though it was brought to Rome to be uſed in that vaſt fabrick, the Emperor would have it kept *propter miraculum*; and ſo it lay unemployed till Nero built his Amphitheatre. To this might be added the maſt of Demetrius's Galeaſſe, which conſiſted but of one Cedar; and that of the float which wafted Caligula's obeliſks out of Egypt, four fathoms in circumference. We read of a Cedar growing in the Iſland of Cyprus, which was one hundred and thirty feet long, and eighteen in diameter; and ſuch it ſeems there are ſome yet growing on Mount Libanus, (though very few in number) one of which our late traveller, Mr. Maundrel †, affirms himſelf to have meaſured of twelve yards ſix inches in girt, ſound, and no leſs than thirty yards from the ground divided into five limbs, each of which was equal to a great tree. We read alſo of the Plane in Athens, whoſe roots extended thirty-ſix cubits farther than the boughs, which were yet exceedingly large; and ſuch another was that moſt famous tree at Veliternus, whoſe arms ſtretched out eighty feet from the ſtem; but theſe trees were ſolid. Let us calculate from the hollow. Beſides thoſe mentioned by Pliny, in the Hercynian Foreſt, the Germans had caſtles in Oaks, and (as now the Indians) ſome punti or canoes of excavated Oak, which would well contain thirty, ſome forty perſons. Such were the antient μονοξυλα, in uſe yet about Cephalonia, as Sir George Wheeler obſerved; and ſuch the Ἄδρυα Πλοία uſed by thoſe of Cypreſs. But what were theſe to a canoe in Congo, which was made to hold two hundred men? And the Lician Platanus, recorded by the Naturaliſt as remaining in his days, had a room in it of eighty-one feet in compaſs, adorned with fountains, ſtately ſeats, and tables of ſtone, for it ſeems it was ſo glorious a tree both in body and head, that Licinius Mutianus (three times conſul and governor of that province) uſed to feaſt his whole retinue in it, chooſing rather to lodge in it than in his golden-roofed palace *. And of later date, that vaſt Cerrus in which an Eremite

† Maundrel's Journey to Jeruſalem, p. 140.

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* The Editors of the fourth and fifth Editions of the SILVA have rendered this ſentence quite unintelligible, by concluding it with the following words: "it *(meaning the tree)* was in compaſs eighty feet, and grew in Aſia:" A thing impoſſible, as the

built his cell and chapel, ſo celebrated by the noble Fracaſtorius in his Poem Malteide. Cant. viii. CHAP. III.

But for theſe capacious hollow trees we need go no farther than our own country; there being, beſides that which I mention in Glouceſterſhire, an Oak at Kidlington-Green in Oxfordſhire, which has been frequently uſed (before the death of the late Judge Morton, near whoſe houſe it ſtood) for the immediate impriſonment of vagabonds and malefactors, till they could conveniently be removed to the county gaol: And ſuch another priſon Dr. Plot does, in his excellent hiſtory of Oxfordſhire, mention out of Ferdinand Hertado in Moravia, to be made out of the trunk of a Willow, twenty-ſeven feet in compaſs. But not to go out of our promiſed bounds, the learned Doctor ſpeaks of an Elm growing on Blechington-Green, which gave reception and harbour to a poor great-bellied woman, whom the unhoſpitable people would not receive into their houſes, who was brought to-bed in it of a ſon, now a luſty young fellow. This puts me in mind of that (I know not what to call it) privilege belonging to a venerable Oak, lately growing in Knoll-Wood, near Trely-Caſtle in Staffordſhire, of which, I think, Sir Charles Skrymſher is owner; that upon oath made of a baſtard's being begotten within the reach of the ſhade of its boughs, (which I aſſure you at the riſing and declining of the ſun is very ample) the offence was not obnoxious to the cenſure of either eccleſiaſtical or civil magiſtrate. Theſe, with our hiſtorian, I rather mention for their extravagant uſe, and to refreſh the reader with ſome variety, than for their extraordinary capacity; becauſe ſuch inſtances were innumerable, ſhould we pretend to illuſtrate this particular with more than needs.

And now I have ſpoken of Elms, and other extravagancies of trees, there ſtands one (as this curious obſerver notes) in Binſey Common, ſix yards in diameter next the ground, which it is conjectured has been ſo im-

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circumference of the *room* is deſcribed to be eighty-one feet. Indeed Mr. Evelyn himſelf ſeems, in his uſual manner, to have quoted this hiſtorical paſſage from memory, otherwiſe he would not have deſcribed the room as containing *fountains*, for which he has not the leaſt authority. Pliny's own deſcription of this wonderful tree is too abſurd to gain the ſmalleſt degree of credit, unleſs we ſuppoſe (what has frequently happened) that an error has been committed in tranſcribing the numerical letters from the antient manuſcripts. Vide Plin. Hiſt. Nat. Lib. xii. c. i. Ed. Harduin. Vol. I. p. 655.

Book III. proved by raiſing an earthen bank, or ſeat about it, which has cauſed it to put forth into ſpurs, it not being ſo conſiderable in the higher trunk.

Compare me then with theſe that nine-fathomed-deep tree ſpoken of by Joſephus Acoſta: the Maſtick tree, ſeen and meaſured by Sir Francis Drake, which was four and thirty yards in circuit; thoſe of Nicaragua and Gambra, which ſeventeen perſons could hardly embrace: Among theſe may come in the Cotton tree deſcribed by Dampier. In India, ſays Pliny, *Arbores tantæ proceritatis traduntur, ut ſagittis ſuperjaci nequeant* (and adds, which I think material, and therefore add alſo) *Hæc facit ubertas ſoli, temperies cæli, & aquarum abundantia.* Such were thoſe trees in Corſica, and near Memphis, recorded by Theophraſtus, &c. and for prodigious height, the two and three hundred feet unparalleled Palms Royal deſcribed by Capt. Ligon, growing in our plantations of the Barbadoes; or thoſe goodly maſts of Fir, which I have ſeen and meaſured, brought from New England; and what Bembus relates of thoſe twenty-fathomed Antarctic trees; or thoſe of which Cardan writes, called Ciba, which riſing in their ſeveral ſtems each of twenty feet in compaſs, and as far diſtant each from other, unite in the bole at fifteen feet height from the ground, compoſing three ſtately arches, and thence aſcending in a ſhaft of prodigious bulk and altitude. Such trees of thirty-ſeven feet diameter, an incredible thing, Scaliger (his antagoniſt) ſpeaks of *ad Gambræ fluvium.* Matthiolus mentions a tree growing in the Iſland of Cyprus, which contained one hundred and thirty feet high ſound timber: And upon Mount Ætna in Sicily, is a place called by them *Ire Caſtayne*, from three Cheſnut trees there ſtanding, where in the cavity of one, yet remaining, a conſiderable flock of ſheep is commonly folded. Kircher's words are theſe, as ſeen by himſelf: *Et quod forſan παράδοξον videri poſſit, oſtendit mihi via dux, unius Caſtaneæ Corticem tantæ amplitudinis, ut intra eam integer pecorum grex à paſtoribus, tanquam in Caula commodiſſima, noctu includeretur.* China Illuſt. p. 185. But this, as I remember, was lately ruined by the direful conflagration about Cattanea *.

NOTES.

* The eruption of Mount Ætna that, in the year 1669, overwhelmed the city of Cattanea, did not deſtroy any of theſe memorable Cheſnut trees, as Mr. Evelyn ſuppoſes. They are ſtill in being, and frequently viſited by the curious and enterprizing Traveller. In the year 1770 Mr. Brydone made an accurate examination of them, and in an elegant hiſtory of his travels, intitled *A Tour through Sicily and Malta*, has favoured us with the following account:

"From this place, it is not leſs than five or ſix miles to the great Cheſnut trees, "through foreſts growing out of the lava, in ſeveral places almoſt impaſſable. Of

And what may we conceive of thoſe trees in the Indies, one of whoſe nuts hardly one man is able to carry; and which are ſo vaſt, as they depend not, like other fruit, by a ſtalk from the boughs, but are produced out of the very body and ſtem of the tree, and are ſufficient to feed twenty perſons at a meal? There were trees found in Brazil, that ſixteen men could hardly fathom about; and the Jeſuits cauſed one of theſe to be felled, for being ſuperſtitiouſly worſhipped by the ſavages, which was one hundred and twenty feet in circumference. The Mexican Emperor is ſaid to have had a tree in his garden, under whoſe ſhade a thouſand men might ſit at a competent diſtance.

We read of a certain Fig in the Caribbee Iſlands, which emits ſuch large buttreſſes, that great planks for tables and flooring are cleft out of them, without the leaſt prejudice to the tree; and that one of theſe does eaſily ſhelter two hundred men under them: And in Nieuhoff's Voyage to the Eaſt-Indies, of the *Kynti*, a kind of Oak, which yield planks of four feet breadth, and forty in length. Strabo, I remember, Geog. lib. xv. talks

NOTES.

"theſe trees there are many of an enormous ſize; but the *Caſtagno de Cento Cavalli* is "by much the moſt celebrated. I have even found it marked in an old map of Sicily, "publiſhed near an hundred years ago; and in all the maps of Ætna, and its environs, "it makes a very conſpicuous figure. I own I was by no means ſtruck with its ap- "pearance, as it does not ſeem to be one tree, but a buſh of five large trees growing "together. We complained to our guides of the impoſition; when they unanimouſly "aſſured us, that by the univerſal tradition and even teſtimony of the country, all "theſe were once united in one ſtem; that their grandfathers remembered this, when "it was looked upon as the glory of the foreſt, and viſited from all quarters; that for "many years paſt it had been reduced to the venerable ruin we beheld. We began to "examine it with more attention, and found that there is an appearance that theſe five "trees were really once united in one. The opening in the middle is at preſent "prodigious; and it does indeed require faith to believe, that ſo vaſt a ſpace was once "occupied by ſolid timber.—But there is no appearance of bark on the inſide of any "of the ſtumps, nor on the ſides that are oppoſite to one another. Mr. Glover and "I meaſured it ſeparately, and brought it exactly to the ſame ſize, viz. two hundred "and four feet round. If this was once united in one ſolid ſtem, it muſt with juſtice "indeed have been looked upon as a very wonderful phænomenon in the vegetable "world, and deſervedly ſtiled the glory of the foreſt.

"I have ſince been told by the Cannonico Recupero, an ingenious eccleſiaſtic of "this place, that he was at the expence of carrying up peaſants with tools to dig round "the *Caſtagno de Cento Cavalli*, and he aſſures me, upon his honour, that he found all

Book III. of fifty horſemen under a tree in India: His words are, ὥσθ' ὑφ' ἑνὶ δένδρῳ μεσημβρίζειν σκιαζομένες ἱππεῖας πεντήκοντα; and of another that ſhaded five ſtadia at once; and in another place of a Pine about Ida, which meaſured twenty-four feet diameter, and of a monſtrous height: To theſe may be added the *Arbor de Rays*, a certain tree growing in the Eaſt-Indies, which propagates itſelf into a vaſt foreſt (if not hindered) by ſhooting up, and then letting a kind of gummy ſtring to fall and drivel from its branches, which takes root in the ground again, and in this proceſs ſpreads a vaſt circuit, the ſingle ſtem of ſome of which are reported to be no leſs than fifty feet diameter, a thing almoſt incredible. To this may be added the *Balete*, deſcribed by Mr. Ray, (Append. vol. III.) and what he cites of Melchion Barros, who found trees proof againſt weapons, reſiſting the force of any edged tool, being of a conſiſture ſo hard: But even this, and all we have hitherto produced, is nothing to what I find mentioned in the late Chineſe Hiſtory, (as it is ſet forth upon occaſion of the Dutch Embaſſy) where they tell us of a certain tree called *Ciennich*, (or the tree of a thouſand years) in the province of *Suchu*, near the city of *Kien*, which is

N O T E S.

" theſe ſtems united below ground in one root. I alledged that ſo extraordinary an ob-
" ject muſt have been celebrated by many of their writers.—He told me that it had,
" and produced ſeveral examples; Philoteo, Carrera, and ſome others. Carrera begs
" to be excuſed from telling its dimenſions, but he ſays, he is ſure there was wood
" enough in that one tree to build a large palace. Their poet Bagolini too has celebra-
" ted a tree of the ſame kind, perhaps the ſame tree *; and Maſſa, one of their moſt
" eſteemed authors, ſays he has ſeen ſolid Oaks upwards of forty feet round; but
" adds, that the ſize of the Cheſnut trees was beyond belief, the hollow of one of
" which, he ſays, contained three hundred ſheep, and thirty people had often been in
" it on horſeback. I ſhall not pretend to ſay, that this is the ſame tree he means; or
" whether it ever was one tree or not. There are many others that are well deſerving
" the curioſity of travellers. One of theſe, about a mile and a half higher on the moun-
" tain, is called *Il Caſtagno del Galea*; it riſes from one ſolid ſtem to a conſiderable
" height, after which it branches out, and is a much finer object than the other. I
" meaſured it about two feet from the ground; it was ſeventy-ſix feet round. There
" is a third called *Il Caſtagno del Nave*, that is pretty nearly of the ſame ſize. All
" theſe grow on a thick rich ſoil, formed originally, I believe, of aſhes thrown out
" by the mountain."

* Supremos inter montes monſtroſior omni
Monſtroſi fœtum ſtipitis Etna dedit.
Caſtaneam genuit, cujus modo concava cortex
Turmam equitum haud parvam continet, atque greges, &c.

ſo prodigiouſly large, as to ſhroud two hundred ſheep under one only branch of it, without being ſo much as perceived by thoſe who approach it. And to conclude with yet a greater wonder, of another in the province of *Chekiang*, whoſe amplitude is ſo ſtupendouſly vaſt, as fourſcore perſons can hardly embrace: Theſe gigantick trees, the Chineſe timber merchants tranſport on floats, upon which they build huts and little cottages, where they live with their families, floating many thouſand miles till all be ſold, as Le Compte tells us. In the mean time we muſt not omit the ſtrange and incredible bulk of ſome Oaks ſtanding lately in Weſtphalia, whereof one ſerved both for a caſtle and fort; and another there, which contained in height one hundred and thirty feet, and, as ſome report, thirty feet diameter; alſo another which yielded one hundred wane-load. I have read of a table of Walnut tree, to be ſeen at St. Nicholas's in Lorrain, which held twenty-five feet broad, all of a piece, and of competent length and thickneſs, rarely flecked and watered: Scamozzi the Architect reports he ſaw it. Such a monſter that might be, under which the Emperor Frederick III. held his magnificent feaſt in 1472. For in this recenſion we will endeavour to give a taſte of more freſh obſervations, and to compare our modern timber with the antient, and that, not only abroad, but without travelling into foreign countries for theſe wonders.

What goodly trees were of old adored, and conſecrated by the Druids, I leave to conjecture from the ſtories of our antient Britains, who, had they left records of their prodigies in this kind, would doubtleſs have furniſhed us with examples as remarkable for the growth and ſtature of trees, as any which we have deduced from the writers of foreign countries; ſince the remains of what are yet in being (notwithſtanding the havock which has univerſally been made, and the little care to improve our woods) may ſtand in fair competition with any thing that antiquity can produce.

There is ſomewhere in Wales an inſcription extant, cut into the wood of an old beam, thus:

SEXAGINTA PEDES FUERANT IN STIPITE NOSTRO,
EXCEPTA COMA QUÆ SPECIOSA FUIT.

This muſt needs have been a noble tree, but not without later parallels; for to inſtance in the ſeveral ſpecies, and ſpeak firſt of the bulks of ſome immenſe trees, there was ſtanding an old and decayed Cheſnut at Fraiting

Book III. in Eſſex, whoſe very ſtump did yield thirty ſizable load of logs. I could produce you another of the ſame kind in Glouceſterſhire, which contains within the bowels of it a pretty wainſcotted room enlightened with windows, and furniſhed with ſeats, &c. to anſwer the Lycian Platanus lately mentioned.

But whilſt I am on this period, ſee what a Tilia that moſt learned and obliging perſon Sir Thomas Brown, of Norwich, deſcribes to me in a letter juſt now received.

"An extraordinary large and ſtately Tilia, Linden, or Lime tree, there groweth at Depeham, in Norfolk, ten miles from Norwich, whoſe meaſure is this: The compaſs, in the leaſt part of the trunk or body, about two yards from the ground, is at leaſt eight yards and a half; about the root near the earth, ſixteen yards; about half a yard above that, near twelve yards in circuit; the height to the uppermoſt boughs about thirty yards. This ſurmounts the famous Tilia of Zurich, in Switzerland; and uncertain it is whether in any Tilicetum or Lime-walk abroad it be conſiderably exceeded: Yet was the firſt motive I had to view it not ſo much the largeneſs of the tree, as the general opinion that no man could even name it; but I found it to be a Tilia Fœmina; and (if the diſtinction of Bauhinus be admitted from the greater and leſſer leaf) a Tilia Platyphyllos, or Latifolia; ſome leaves being three inches broad; but to diſtinguiſh it from others in the country, I called it Tilia Coloſſæa Depehamenſis."

A Poplar tree, not much inferior to this, he likewiſe informs me grew lately at Harling, by Thetford, at Sir William Gawdy's gate, blown down by that terrible hurricane about four years ſince.

Thus that learned perſon: From theſe inſtances, I am not apt ſo much to admire what is pretended ſo mightily to exceed the refreſhing ſhades of ſome of our Oaks, Beeches, Elms, and other ample umbrages, if diligently compared, as I am to impute it to what the younger Pliny attributes to men's affecting novelties, that *tanta ſuarum rerum ſatietas, cliarumque aviditas.*

But here does properly intervene the *Linden* of Schalouſe, in Swiſſe, under which is a bower compoſed of its branches, capable of containing three hundred perſons ſitting at eaſe: it has a fountain ſet about with many tables, formed only of the boughs. to which they aſcend by ſteps, all

kept ſo accurately, and ſo very thick, that the ſun never looks into it. But this is nothing to that prodigious Tilia of Neuſtadt, in the Duchy of Wirtemberg, ſo famous for its monſtroſity, that even the city itſelf receives a denomination from it, being called by the Germans *Neuſtadt ander groſſen Linden*, or Neuſtadt by the great Lime tree. The circumference of the trunk is twenty-ſeven feet four fingers; the ambitus, or extent of the boughs, four hundred and three *feré*; the diameter, from ſouth to north, one hundred and forty-five; from eaſt to weſt, one hundred and nineteen feet; ſet about with divers columns and monuments of ſtone, (eighty-two in number at preſent, and formerly above an hundred more) which ſeveral Princes and Noble Perſons have adorned, and celebrated with inſcriptions, arms, and devices, and which, as ſo many pillars, ſerve likewiſe to ſupport the umbragious and venerable boughs; and that even the tree had been much ampler, the ruins and diſtances of the columns declare, which the rude ſoldiers have greatly impaired.

By the date of the antienteſt columns, yet intire, namely, *Anno* 1555, may be conjectured how goodly a tree it was almoſt two hundred years ſince. The inſcriptions on the ſeveral arms and ſupporters are as follows:

D. V. H. Z. W. CLL——*Graff zu Leuchtenberg.* 1591. 1583. 1575. *Albert von Roſenberg Ritter.* 1591. *Wolff Keidel alter Furleutium.* 1555. (Some report he planted it.) *Hans Heinrie vonder Tana.* 1583, *Conrad von Flbeg.* 1575. *Friz Nerter von Hertcnek.* 1575. *Wirich von Gemmingen.* 1575. *Bartol—— Mot.* 1555. V. *Hans Funk der zeit Burgermeiſter Die erſt*, 1555. *Hans Ulrich Stigelheimer zu Durathenig Fuctlicher. hr. Hoffmeiſter.* 1591.

Præſul de Langheim rediens Ciſterliæ ab urbe
Pyramidem hanc poſuit flammis Cœleſtibus auctam.
Sentiat hæc etiam Numen ſpirabile toto
Pectore, & illius ſemper ſit munere fœlix.

Johann. Abt zu *Langh.* 1601. *Joh. Abt* zu *Schoenthal.* 1584. *Eberhard von Gimmingen.* 1555. *David von Helmſtad Amtman. Graff Fridrich* zu *Mompelyard. Hans Henrick von Lammeſtein. Sigiſmund Signiger.* L. H. Z. W. A. 353. G. L. *Mary Graff au Brandenb.* 1562. *Georg. Erneſt Graff* zu *Henneb. Herr* zu *Aſchaffb.* 1575. *Michel Helmling Statt-ſchreiber.* 1555. *Hans Ulrick von Steine.* 1575. *Daniel von Helmſtatt.* zu *Kappenaw.* 1556. —— *Stamel von Reiſchach* 1575. *Willhelm von Crombach* 1588. *Bernolph von*

BOOK III. *Gammingen.* 1588. *Schweiker Wumbold von Umſtatt.* 1591. *Heinrich Linz Pfarrer* zu *Uden. Andreas von Oberbach Vorſtmeiſt.* zu *Neu-ſtatt. Neubrech: Bart Keller* zu *Neu-ſtatt.* 1557. —— *Ernberg. Thomas Buſch von Schorndorff. Wolffang von Gemmingen* 1588. *Feit Kumeter Forſtmeiſter.* 1551 and 1530.

After this we might forbear the naming that at Tillburg, near Buda in Hungary, growing in the middle of the ſtreet, extending to ſixty-two paces from the ſtem, ſuſtained by twenty-eight columns: Nor that nearer us, at Cleves in the Low Countries, a little without the entering into the town, cut in eight faces ſupported with pillars, and containing a room in the middle, the head of the tree curiouſly ſhaped. I ſay, I need not have charged this paragraph with half theſe, but to ſhew how much more the Lime tree ſeems to be diſpoſed to be brought into theſe arborious wonders, than other trees of ſlower growth; and yet I am told of a White Thorn, at Worms in Germany, planted in the center of the quadrangle of the great church, whoſe branches, held up with ſtone, are in circle fifty paces: Several more occur, too tedious to recite. But what is all this, take the moſt ſpreading of them, to what we ſhall ſhew, whilſt that of Neuſtadt comes not yet by forty feet near to the dimenſions of an Oak ſtanding lately in Workſop Park, belonging to his Grace the Duke of Norfolk, Earl Marſhal of England, ſpreading almoſt three thouſand yards ſquare, and under the ſhade whereof near a thouſand horſe might commodiouſly ſtand at once. But, beſides the gigantic Lime tree, there is likewiſe a White Thorn, brought (as the tradition goes) a ſmall twig out of Paleſtine, *Anno* 1470, by Eberhard, firſt Duke of Wirtemberg, and planted near Tubing, where he founded St. Peter's Monaſtery, the branches whereof being ſuſtained by forty columns of ſtone, is yet a flouriſhing tree. It is probable that of Glaſtonbury is of this kind, and above a thouſand years antienter, if the report be true. At Forti grows a Filbert whoſe trunk is as big as three men's middles: Near Eſsling is a Juniper tree of almoſt two feet diameter in the lower trunk, and very tall. Theſe prodigies, with ſeveral more, we have from Dr. Faber, Phyſician to Frederic Duke of Wirtemberg, and collected by the late induſtrious Jeſuit Schotti, in his Appendix ad Lib. ii. De Mirabilibus Miſcellaneis. Nor may here that goodly Birch tree be forgotten, which growing in one of the courts of the palace of Augſburgh, is ſo ſpreading, as that the branches will cover three hundred and ſixty-five tables, even as many as there are days in the year, with its ſhade, as Tavernier tells us in his Travels. Mr. Cook, in his ingenious and uſeful Treatiſe, mentions a Witch Elm growing within theſe

three or four years in Sir Walter Baggot's park in the county of Stafford, which, after two men had been five days felling, lay forty yards in length, and was at the ſtool ſeventeen feet diameter: It broke in the fall fourteen load of wood, forty-eight in the top: Yielded eight pair of naves, eight thouſand ſix hundred and ſixty feet of boards and planks: It coſt ten pounds ſeventeen ſhillings the ſawing; the whole eſteemed ninety-ſeven tuns. This was certainly a goodly ſtick! *

What other prodigious trees do at preſent, and did formerly, abound in that country, may be ſeen in Dr. Plot's Natural Hiſtory. Such was an Oak at Narbury, of fifteen yards in girth, which being felled, two men at either ſide on horſeback could not ſee one another: Alſo an Aſh of eight feet diameter, the timber of which was valued at thirty pounds.

I am told of a very Withy tree, to be ſeen ſomewhere in Berkſhire, which is increaſed to a moſt ſtupendous bulk; and of two Witch Haſel trees of prodigious ſize, growing in Oakſey-Park, belonging to Sir Edw. Pooles, near Malmſbury in Wiltſhire, not inferior to the largeſt Oaks: But theſe, for arriving haſtily to their *acme* and period, and generally not ſo conſiderable for their uſe, I paſs to the Aſh, Elm, Oak, &c.

There were of the firſt of theſe divers which meaſured in length one hundred and thirty-two feet, ſold lately in Eſſex †; and in the manor of Horton (to go no farther than the pariſh of Ebſham in Surry, belonging to my brother Richard Evelyn, Eſq;) there are Elms ſtanding in good numbers, which would bear almoſt three feet ſquare for more than forty feet in height, which is, in my judgment, a very extraordinary matter. They grow in a moiſt gravel, and in the hedge-rows.

NOTES.

* I have heard, but cannot authenticate the fact, that a Wych-Elm was lately felled in the Earl of Hertford's park at Liſburne, in Ireland, which was found to contain ninety-nine tuns of timber.

† There ſtands now at Ley, or Leix, in the Queen's County in Ireland, an Aſh tree thirty-nine feet in circumference near the ground; at about ſix feet from the ground twenty-eight feet. The bole does not riſe above fifteen feet high before it ſends out its noble branches, which extend round it to a prodigious diſtance. The height of the tree is not leſs than an hundred and twenty feet, but its youthful vigour and wonderfully thick foliage promiſe a conſiderable increaſe

Book III. Not to inſiſt upon Beech, which are frequently very large, there are Oaks of forty feet high and five feet diameter yet flouriſhing in divers old parks of our Nobility and Gentry; and Firs of one hundred and fifty feet in height, which are exceeded by one growing in a wood about Bern by almoſt one hundred feet, as Chabrous tells us.

A large and goodly Oak there is at Reedham, in Sir Richard Berney's Park of Norfolk, which I am informed was valued at forty pounds the timber, and twelve pounds the lopping wood.

Nor are we to over-paſs thoſe memorable trees which ſo lately flouriſhed in Dennington Park near Newbury; amongſt which three were moſt remarkable from the dedication of the ingenious planter (if tradition hold) the famous Engliſh Bard, Geoffry Chaucer; of which one was called the King's, another the Queen's, and a third Chaucer's Oak. The firſt of theſe was fifty feet in height before any bough or knot appeared, and cut five feet ſquare at the but-end, all clear timber. The Queen's was felled ſince the wars, and held forty feet of excellent timber, ſtraight as an arrow in growth and grain, and cutting four feet at the ſtub, and near a yard at the top; beſides a fork of almoſt ten feet clear timber above the ſhaft, which was crowned with a ſhady tuft of boughs, amongſt which, ſome were on each ſide curved like rams horns, as if they had been ſo induſtriouſly bent by hand. This Oak was of a kind ſo excellent, cutting a grain clear as any clap-board, (as appeared in the wainſcot which was made thereof) that it is a thouſand pities ſome ſeminary of the acorns had not been propagated, to preſerve the ſpecies. Chaucer's Oak, though it were not of theſe dimenſions, yet was it a very goodly tree: And this account I received from my moſt honoured friend Phil. Packer, Eſq; whoſe Father (as lately the Gentleman his Brother) was proprietor of this park: But that which I would farther remark, upon this occaſion, is the bulk and ſtature to which an Oak may poſſibly arrive within leſs than three hundred years, ſince it is not ſo long that our Poet flouriſhed, (being in the reign of King Edward III.) if at leaſt he were indeed the planter of thoſe trees, as it is confidently affirmed. I will not labour much in this enquiry, becauſe an implicit faith is here of great encouragement; and it is not to be conceived what trees of a good kind, and in apt ſoil, will perform in a few years; and this, I am informed, is a ſort of gravelly clay, moiſtened with ſmall and frequent ſprings. In the meanwhile, I have often wiſhed that Gentlemen were more curious of tranſmitting to poſterity ſuch records, by noting

the years when they begin any conſiderable plantation, that the ages to come may have both the ſatisfaction and encouragement by more accurate and certain calculations. Henry Ranjovius planted a grove in Ditmarſh, *Anno* 1580, of Oak, Fir, Beech, Birch, &c. and erected a ſtone with this inſcription, (which I mention not for its elegancy, but example) *An. Dom.* 1580. *Quercus, Abietes, Betulas, &c. Plantavit: Annum & Initium ſationis adſcribi juſſit, ut earum Ætatem exploraret poſteritas; quod in omnia Orbis ſæcula æternæ Divinitati commendat*, as I find it recorded by that induſtrious genealogiſt, Scipio Amiratus of Florence: But the only inſtance I know of the like in our own country is in the park at Althorp in Northamptonſhire, the magnificent ſeat of the Right Hon. the Earl of Sunderland. I find a Jewiſh tradition, cited by the learned Bochart, that Noah planted the trees (he ſuppoſes Cedars) of which he afterwards built the ark that preſerved him: Nor was it eſteemed any diminution for Princes themſelves to plant trees with that hand which held the ſcepter and reins of empire: So as in the Voorhout of the Hague, ſtands a tree placed there by the hands of the Emperor Charles, which is yet in its prime growth, and no ſmall boaſt of the good people. But to proceed:

There was in Cunſborough (ſometimes belonging to my Lord of Dover) ſeveral trees bought by a Cooper, of which he made ten pounds per yard for three or four yards, as I have been credibly aſſured. But where ſhall we parallel that mighty tree which furniſhed the main-maſt to the ſovereign of our ſeas, which being one hundred feet long ſave one, bare thirty-five inches diameter; yet was this exceeded in proportion and uſe by that Oak which afforded thoſe prodigious beams that lie 'thwart her. The diameter of this tree was four feet nine inches, which yielded four ſquare beams of four and forty feet long each of them. The Oak grew about Framlingham in Suffolk; and indeed it would be thought fabulous to recount only the extraordinary dimenſions of ſome timber-trees growing in that country, and the exceſſive ſizes of theſe materials, had not mine own hands meaſured a plank, more than once, of above five feet in breadth, nine and an half in length, and ſix inches thick, all intire and clear, not reckoning the ſlab *. This plank, cut out of a tree felled by my grandfather's order, was made a paſtry-board, and lay on a frame of ſolid brick-work

NOTES.

* The word *Slab*, amongſt Sawyers, is the *Aſſer materiæ extimus*, or ſappy ſubſtance next the bark.

BOOK III.

at Wotton, in Surry, where it was ſo placed before the room was finiſhed about it, or wall built, and yet abated by one foot ſhorter, to confine it to the intended dimenſions of the place; for at firſt it held this breadth, full ten feet and an half in length: By an inſcription cut in one of the ſides, it had lain there above an hundred years. To this may be added that table of one plank, of above ſeventy-five feet long, and a yard broad thro' the whole length, now to be ſeen in Dudley-Caſtle Hall, which grew in the park deſcribed by Dr. Plot in his Natural Hiſtory of Staffordſhire. Merſennus tells us that the great ſhip called the Crown, which the late French King cauſed to be built, has its keel-timber one hundred and twenty feet long; and the main-maſt twelve feet diameter at the bottom, and eighty-five in height.

To theſe I might add a Yew-tree * in the church-yard of Crowhurſt, in the county of Surry, which I am told is ten yards in compaſs; but eſpecially that ſuperannuated Yew-tree growing now in Braburne church-yard, not far from Scots-Hall in Kent; which being fifty-eight feet eleven inches in the circumference, will bear near twenty feet diameter, as it was meaſured firſt by myſelf imperfectly, and then more exactly for me, by order of the late Right Honourable Sir George Carteret, Vice-Chamberlain to his Majeſty, and late Treaſurer of the Navy: Not to mention the goodly planks, and other conſiderable pieces of ſquared and clear timber, which I obſerved to lie about it, that had been hewed and ſawn out of ſome of the arms only torn from it by impetuous winds. Such another monſter, I am informed, is alſo to be ſeen in Sutton church-yard, near Wincheſter. To theſe we add what we find taken notice of by the learned and induſtriouſly curious Dr. Plot, in his Natural Hiſtory of Oxfordſhire; particularly an Oak between Nuncham-Courtney and Clifton, ſpreading, from bough-end to bough-end, eighty-one feet, ſhading in circumference five hundred and ſixty ſquare yards of ground, under which two thouſand four hundred and twenty men may commodiouſly ſtand in ſhelter. And a bigger than this may be ſeen near the gate of the water-walk at Magdalen-College, whoſe branches ſhoot ſixteen yards from the ſtem; likewiſe another at Rycote, in Lord Norris's park, extending its arms fifty-four feet, under which three hundred and four horſes, or four thouſand three

NOTES.

* The ingenious Mr. Pennant, in his Tour in Scotland, mentions a Yew-tree in Fotheringal Church-yard, whoſe ruins meaſured fifty-ſix feet and a half in circumference.

hundred and ſeventy-four men may ſufficiently ſtand. This is that *Robur Britannicum* ſo much celebrated by the late Author of Dodona's Grove, and under which he leans contemplating in the frontiſpiece. But theſe (with infinite others which I am ready to produce) might fairly ſuffice to vindicate and aſſert our propoſition, as it relates to modern examples, and ſizes of timber-trees, comparable to any of the antients, remaining upon laudable and unſuſpected records, were it not great ingratitude to conceal a moſt induſtrious and no leſs accurate account, which comes to my hands from Mr. Halton, Auditor to the Right Honourable the moſt Illuſtrious and Noble Henry Duke of Norfolk, Earl Marſhal of England.

In SHEFFIELD LORDSHIP.

In the Hall-park, near unto Rivelin, ſtood an Oak which had eighteen yards without bough or knot, and carried a yard and ſix inches ſquare at the ſaid height or length, and not much bigger near the root; it ſold twelve years ago for eleven pounds. Conſider the diſtance of the place and country, and what ſo prodigious a tree would have been worth near London.

The names of the perſons who gave intelligence of the particulars. Edw. Rawſon.

In Firth's Farm, within Sheffield Lordſhip, about twenty years ſince, a tree blown down by the wind made, or would have made, two forge-hammer beams; and in thoſe, and the other wood of that tree, there was worth, or made, fifty pounds; and Godfrey Frogat, who is now living, did oft ſay he loſt thirty pounds by the not buying of it.

Capt. Bullock.

A hammer-beam is not leſs than ſeven yards and a half long, and four feet ſquare at the barrel.

In Sheffield park, below the Manor, a tree was ſtanding which was ſold by one Gifford (ſervant to the then Counteſs of Kent) for two pounds ten ſhillings, to one Nicholas Hicks, which yielded of ſawn wair fourteen hundred, and, by eſtimation, twenty cords of wood.

A wair is two yards long and one foot broad, ſix ſcore to the hundred: ſo that in the ſaid tree were ten thouſand and eighty feet of boards, which, if any of the ſaid boards were more than half an inch thick, renders the thing yet more admirable.

Ed. Morphy, Wood-ward.

In the upper end of Rivelin ſtood a tree, called the Lord's Oak, of twelve yards about, and the top yielded twenty-one cord; cut down about thirteen years ſince.

Book III. In Sheffield Park, Ann. 1646, ſtood above one hundred trees worth a thouſand pounds, and there are yet two worth above twenty pounds. Still note the place and market.

In the ſame park, about eight years ago, Ralph Archdall cut a tree that was thirteen feet diameter at the kerf, or cutting-place near the root.

In the ſame park, two years ſince, Mr. Sittwell, with Jo. Magſon, did chooſe a tree, which, after it was cut, and laid aſide flat upon a level ground, Samuel Staniforth, a keeper, and Edward Morphy, both on horſeback, could not ſee over the tree one another's hat crowns. (And ſuch another was the Narbury Oak, mentioned in a former part of this chapter.) This tree was afterwards ſold for twenty pounds.

In the ſame park, near the old Ford, is an Oak tree, yet ſtanding, of ten yards circumference. *

John Halton. In the ſame park, below the Conduit plain, is an Oak tree which bears a top, whoſe boughs ſhoot from the bole ſome fifteen and ſome ſixteen yards.

Then admitting fifteen yards and a half for the common, or mean extent of the boughs from the bole, which being doubled, is thirty-one yards; and if it be imagined for a diameter, becauſe the ratio of the diameter to the circumference is $\frac{113}{355}$ it follows $113.\ 355.\ ::\ 31.97\ \frac{44}{113}$ yards, which is the circumference belonging to this diameter.

Then further it is demonſtrable in geometry, that half the diameter multiplied into half the circumference, produces the area or quantity of the circle, and that will be found to be $754\frac{347}{452}$, which is 755 ſquare yards *feré*.

NOTES.

* Neither this, nor any of the Oaks mentioned by Mr. Evelyn, bear any proportion to one now growing at Cowthorpe, near Wetherby, upon an eſtate belonging to the Right Hon. Lady Stourton. The annexed plate is taken from a drawing made upon the ſpot by my worthy and ingenious friend William Burgh, Eſq. The dimenſions are almoſt incredible. Within three feet of the ſurface it meaſures ſixteen yards, and cloſe by the ground, twenty-ſix yards. Its height, in its preſent and ruinous ſtate (1776) is about eighty-five feet, and its principal limb extends ſixteen yards from the bole. Throughout the whole tree, the foliage is extremely thin, ſo that the anatomy of the antient branches may be diſtinctly ſeen in the height of ſummer. When compared to this, all other trees are but *Children* of the Foreſt.

Wm Burgh Esq.r del.t

A Winter View of the Carthorpe Oak.

J. Walpole sc.

Then laſtly, if a horſe can be limited to three ſquare yards of ground to ſtand on, (which may ſeem a competent proportion of three yards long, and one yard broad) then may two hundred and fifty-one horſes be well ſaid to ſtand under the ſhade of this tree. But of the more northern cattle, certainly above twice that number.

WORKSOP PARK.

In this park, at the corner of Bradſhaw-rail, lieth the bole of an Oak tree, which is twenty-nine feet about, and would be found thirty if it could be juſtly meaſured, becauſe it lieth upon the ground; and the length of the bole is ten feet, and no arm nor branch upon it. Ken. Homer.

In the ſame park, at the White Gate, a tree did ſtand that was from bough-end to bough-end (that is from the extreme ends of two oppoſite boughs) one hundred and eighty feet; which is witneſſed by Jo. Magſon and George Hall, and meaſured by them both. Jo. Hall. Geo. Magſon.

Then becauſe 180 feet, or 60 yards, is the diameter, 30 yards will be the ſemidiameter: And by the former analogies

$$113.\ 355 :: 60.\ 188\tfrac{1}{2} \text{ and } 1.\ 30 :: 94\tfrac{1}{4}.\ 2827\tfrac{1}{2}$$

That is, the content of ground upon which this tree perpendicularly drops, is above 2827 ſquare yards, which is above half an acre of ground: and the aſſigning three ſquare yards (as above) for an horſe, there may 942 be well ſaid to ſtand in this compaſs.

In the ſame park (after many hundreds ſold and carried away) there is a tree which did yield quarter-cliff bottoms that were a yard ſquare; and there is of them to be ſeen at Workſop at this day, and ſome tables made of the ſaid quarter-cliff likewiſe. Jo. Magſon.

In the ſame park, in the place there called the Hawk's Neſt, are trees 40 feet long of timber, which will bear two feet ſquare at the top end or height of forty feet.

If then a ſquare, whoſe ſide is two feet, be inſcribed in a circle, the proportions at that circle are,

	Feet
Diameter	2 : 8284
Circumference	8 : 8858
Area	6 : 2831

BOOK III.

And becauſe a ton of timber is ſaid to contain forty ſolid feet, one of theſe columns of Oak will contain above ſix ton of timber and a quarter*; in this computation they are taken to be Cylinders, and not tapering like the ſegments of a Cone.

* A ſtatutable ton of timber is by ſome reckoned forty-three feet of ſolid: and to a load fifty.

WELBECK LANE.

The Oak which ſtands in this lane, called Greendale Oak, hath at theſe ſeveral diſtances from the ground theſe circumferences,

	Feet	Feet Inches
at	1	33 : 01
at	2	28 : 05
at	6	25 : 07

The breadth is, from bough-end to bough-end, diametrically 81 feet; the height from the ground to the topmoſt bough, 81 feet. [This dimenſion taken from the proportion that a gnomon bears to the ſhadow] There are three arms broken off and gone, and eight very large ones yet remaining, which are very freſh and good timber.

Eighty-eight feet is 29½ yards, which being in this caſe admitted for the diameter of a circle, the ſquare yards in that circumference will be 676 *feré*; and then allowing three yards (as before) for a beaſt, leaves 225 beaſts, which may poſſibly ſtand under this tree.

But the Lord's Oak, that ſtood in Rivelin, was in diameter three yards and 28 inches, and exceeded this in circumference three feet, at one foot from the ground.

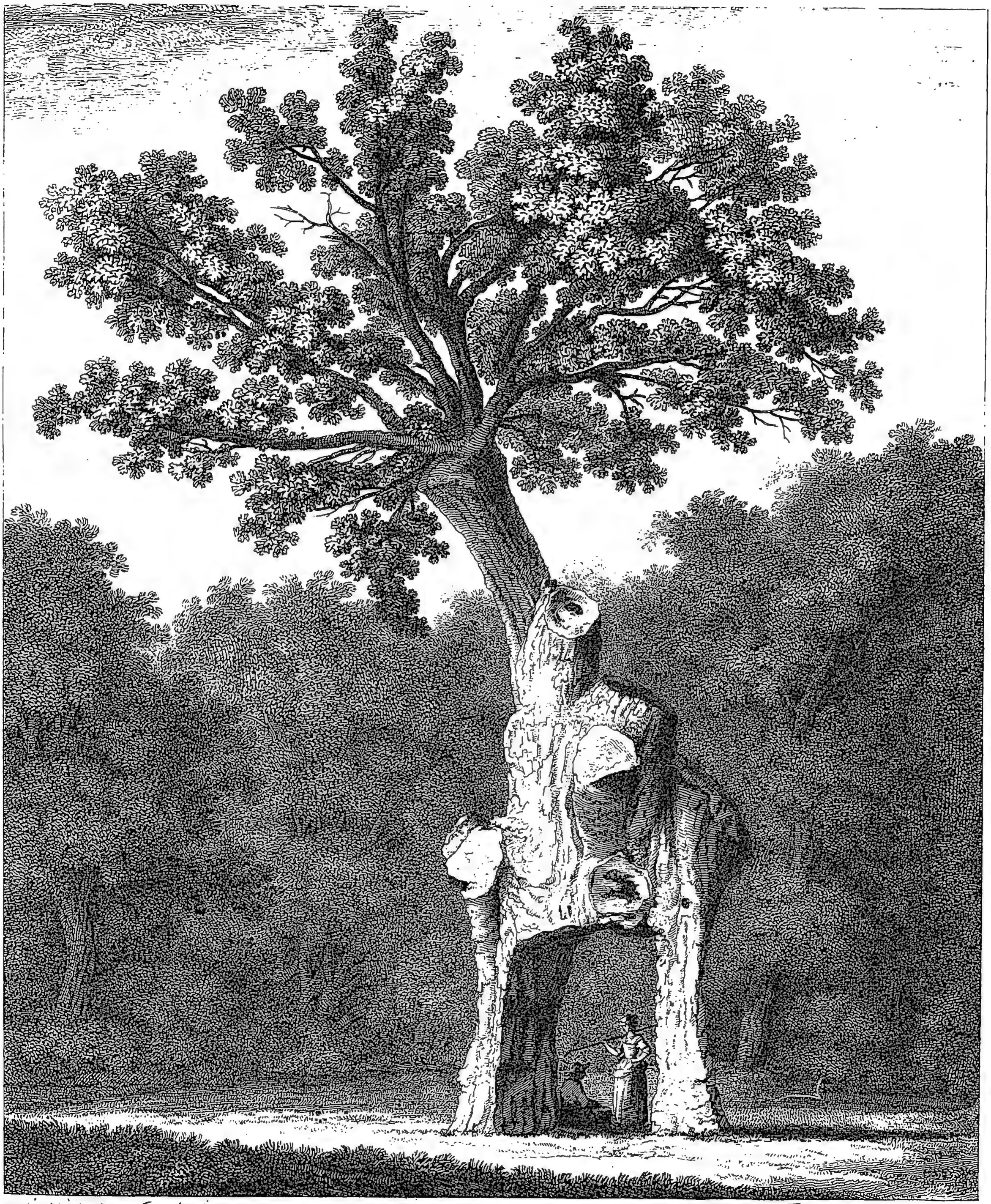
SHIRE-OAK.

Hen. Homer.

Shire-Oak is a tree ſtanding in the ground late Sir Thomas Hewet's, about a mile from Workſop Park, which drops into three Shires, viz. York, Nottingham, and Derby, and the diſtance from bough-end to bough-end is 90 feet, or 30 yards.

This circumference will contain near 707 ſquare yards, ſufficient to ſhade 235 horſes.——Thus far the accurate Mr. Halton.

Now ſuch venerable trees (eſpecially conſpicuouſly placed as this laſt) ſhould be ſpared for the moſt noble and natural boundaries to great pariſhes, and Gentlemen's eſtates; famous for which is the Cheſnut tree at Tamworth in Glouceſterſhire, which continued a ſignal boundary to that Manor in King Stephen's time, as it ſtands upon record. And now before



J. & H. Grimm Excud. 1795

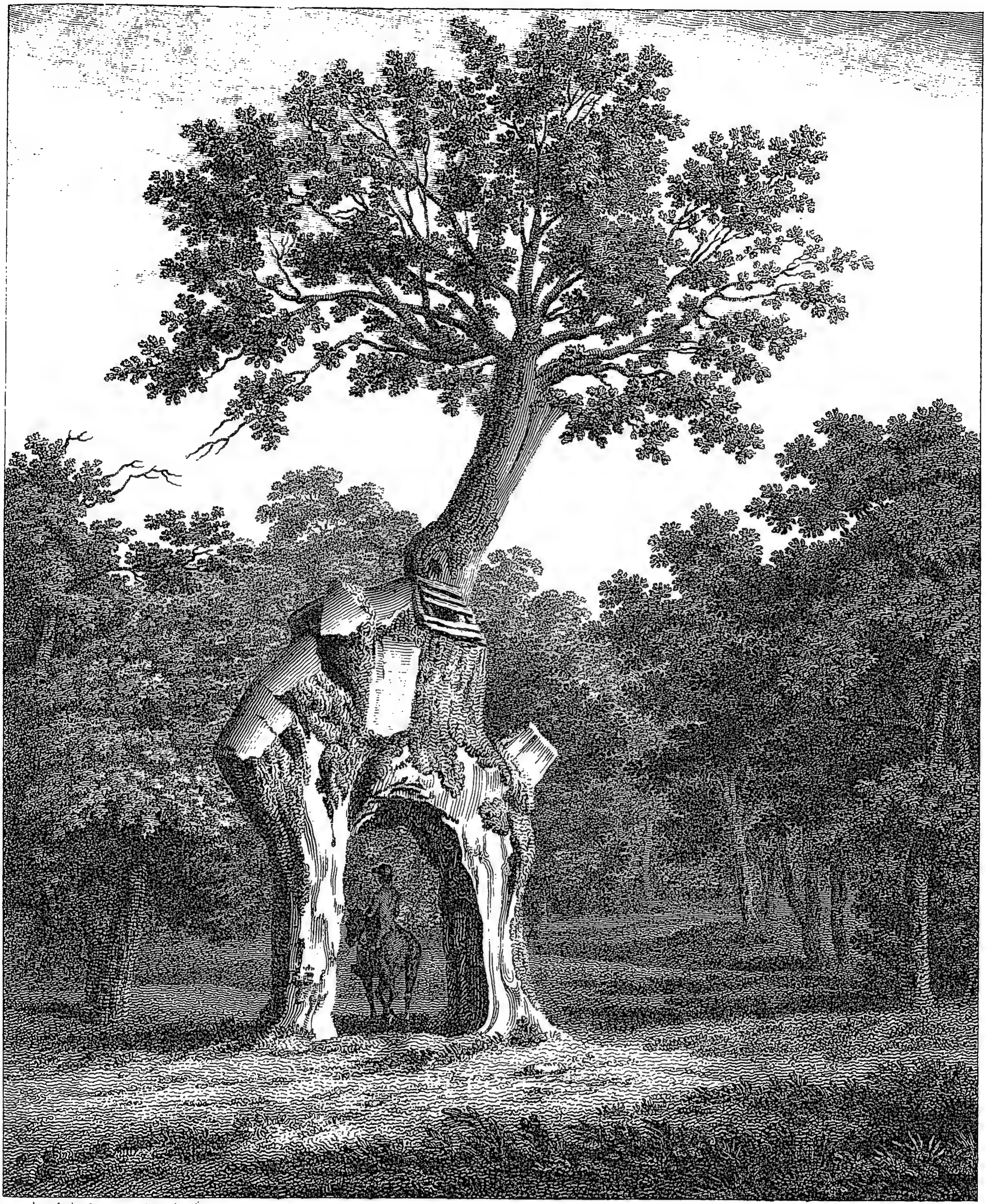
Thos. Simmons Sculpsit.

A South East View of the Gate Dale Clay near Welbeck.



	F. I.
Diameter at a.b	11 „ 6
Diam.r at c.d	14 „ 2
Girth upon Stretch at c.d	35 „ 0
Girth at the same place to follow the hollows of the Tree.	38 „ 0
Height of the Tree a.e	53 „ 6
Height at a.f	31 „ 4
Height of the Arch g.h	10 „ 2
Width at i.k	6 „ 2
Girth of the Stump e.l	11 „ 0
Height at b.d	13 „ 0

Published Jan.y 1st 1776 by J. Stockdale, Piccadilly, as the Act directs.



T. & W. Grimm Excudit 1795.

T. Barker Inspexit.

A North West View of the Great Pitch Oak near Welbeck.

Published according to Act of Parliament 1st Jan.y 1795 by the Art Society



	F. I
Diameter at a. b	12 . 0
Diam.r at c.d	11 . 0
Diam.r at e.f	13 . 3
Girth at c.d	34 . 10
Height of the Tree g.l	53 . 6
Height of the Arch g.h	10 . 2
Width at i.k	6 . 2

Published According to the Act of Parliament 1st Aug.st 1787 by the Art Society.

I ſhut up theſe encouraging inſtances, I am informed by a perſon of credit, that an Oak in Sheffield Park, called the Lady's Oak, when felled, contained forty-two tons of timber, which had arms that held at leaſt four feet ſquare for ten yards in length; the body ſix feet of clear timber: That in the ſame park one might have choſen above one thouſand trees worth above ſix thouſand pounds; another thouſand worth four thouſand pounds, *& ſic de cæteris*. To this Mr. Halton replies, That it might poſſibly be meant of the Lord's Oak already mentioned to have grown in Rivelin; for now Rivelin itſelf is totally deſtitute of that iſſue ſhe once might have gloried in of Oaks, there being only the Hall Park adjoining, which keeps up with its number of Oaks. And as to the computation of one thouſand trees formerly in Sheffield Park, worth ſix thouſand pounds, it is believed there were a thouſand much above that value, ſince, in what is now incloſed, it is evident touching one hundred worth a thouſand pounds. I am informed, that an Oak (I think in Shropſhire) growing lately in a copſe of my Lord Craven's, yielded nineteen tons and a half of timber, twenty-three cord of fire-wood, two load of bruſh, and two load of bark: And my worthy friend, Leonard Pinckney, Eſq; lately Firſt Clerk of his Majeſty's Kitchen, did aſſure me, that one John Garland built a very handſome barn, containing five bays, with pan, poſts, beams, ſpars, &c. of one ſole tree, growing in Workſop Park. I will cloſe this with an inſtance which I greatly value, becauſe it is tranſmitted to me from that Honourable and Noble Perſon Sir Edward Harley. "I am (ſays he) aſſured by an inquiſition taken about three hundred years ſince, that a park of mine, and ſome adjacent woods, had not then a tree capable to bear acorns; yet that very park I have ſeen full of great Oaks, and moſt of them in the extremeſt wane of decay. The trunk of one of theſe Oaks afforded ſo much timber as upon the place would have yielded fifteen pounds, and did compleatly ſeat with wainſcot-pews a whole church. You may pleaſe (ſays he, writing to Sir Robert Murray) to remember when you were here, you took notice of a large tree, newly fallen; when it was wrought up, it proved very hollow and unſound: One of its cavities contained two hogſheads of water: Another was filled with better ſtuff, wax and honey: Notwithſtanding all defects, it yielded, beſides three tons of timber, twenty-three cords of wood. But my own trees are but chips in compariſon of a tree in the neighbourhood, in which every foot forward, one with another, was half a ton of timber; it bore five feet ſquare, forty feet long; it contained twenty ton of timber, moſt of it ſold for one pound per ton; beſides that, the boughs afforded

Book III. twenty-five cords of fuel-wood: This was called the Lady-Oak. Is it not pity ſuch goodly creatures ſhould be devoted to Vulcan?" So far this Noble Gentleman, to which I would add *Diræ*, a deep execration of Iron-Mills, and I had almoſt ſaid Iron-Maſters too,

Quos ego—ſed motos præſtat componere——

for I ſhould never finiſh, to purſue theſe inſtances thro' our once goodly magazines of timber for all uſes, growing in this our native country, comparable, as I ſaid, to any we can produce of elder times; and that not only (though chiefly) for the encouragement of planters, and preſervers of one of the moſt excellent and neceſſary materials in the world for the benefit of man, but to evince the continued vigour of nature, and to reproach the want of induſtry in this age of ours; and (that we may return to the argument of this large chapter) to aſſert the procerity and ſtature of trees from their very great antiquity: For certainly, if that be true, which is by divers affirmed concerning the Quercetum of Mamre, (where the Patriarch entertained his angelical gueſts) recorded by Euſebius to have continued till the time of Conſtantine the Great, we are not too prejudicately to cenſure what has been produced for the proofs of their antiquity; nor for my part do I much queſtion the authorities. But let this ſuffice; what has been produced, being not only an hiſtorical ſpeculation of encouragement and uſe, but ſuch as was pertinent to the ſubject under conſideration, as well as what I am about to add concerning the texture and ſimilar parts of the body of trees, which may alſo hold in ſhrubs, and other lignous plants, becauſe it is both a curious and rational account of their anatomization, and worthy of the ſagacious enquiry of that learned perſon, the late Dr. Goddard, as I find it entered amongſt other of thoſe precious collections of this illuſtrious ſociety.

The trunk or bough of a tree being cut tranſverſely plain and ſmooth, ſheweth ſeveral circles or rings more or leſs orbicular, according to the external figure, in ſome parallel proportion, one without the other, from the center of the wood to the inſide of the bark, dividing the whole into ſo many circular ſpaces. Theſe rings are more large, groſs, and diſtinct in colour and ſubſtance in ſome kind of trees, generally in ſuch as grow to a great bulk in a ſhort time, as Fir, Aſh, &c. ſmaller or leſs diſtinct in thoſe thoſe that either not at all, or in a longer time grow great; as Quince, Holly, Box, Lignum Vitæ, Ebony, and the like ſad-coloured and hard woods; ſo that by the largeneſs or ſmallneſs of the rings, the quickneſs or ſlowneſs of the growth of any tree may, perhaps, at certainty be eſtimated.

Theſe ſpaces are manifeſtly broader on the one ſide than on the other, eſpecially the more outer, to a double proportion, or more; the inner being near an equality.

It is aſſerted, that the larger parts of theſe rings are on the ſouth and ſunny ſide of the tree, (which is very rational and probable) inſomuch, that by cutting a tree tranſverſe, and drawing a diameter through the broadeſt and narroweſt parts of the rings, a meridian line may be deſcribed.

The outer ſpaces are generally narrower than the inner, not only in their narrower ſides, but alſo on their broader, compared with the ſame ſides of the inner; notwithſtanding which, they are for the moſt part, if not altogether, bigger upon the whole account.

Of theſe ſpaces, the outer extremities in Fir, and the like woods, that have them larger and groſſer, are more denſe, hard, and compact; the inner more ſoft and ſpongy; by which difference of ſubſtance it is, that the rings themſelves come to be diſtinguiſhed.

According as the bodies and boughs of trees, or ſeveral parts of the ſame, are bigger or leſſer, ſo is the number, as well as the breadth of the circular ſpaces, greater or leſs; and the like according to the age, eſpecially the number.

It is commonly, and very probably aſſerted, that a tree gains a new ring every year. In the body of a great Oak in the New-Foreſt cut *tranſverſely even*, (where many of the trees are accounted to be ſome hundreds of years old) three and four hundred have been diſtinguiſhed. In a Fir tree, which is ſaid to have juſt ſo many rows of boughs about it as it is of years growth, there has been obſerved juſt *one* leſs immediately above one row than immediately below. Hence ſome probable account may be given of the difference between the outer and the inner parts of the rings, that the outermoſt being newly produced in the ſummer, the exterior ſuperficies is condenſed in the winter.

In the young branches and twigs of trees there is a pith in the middle, which in ſome, as Aſh, and eſpecially Elder, equals or exceeds in dimenſions the reſt of the ſubſtance, but waxes leſs as they grow bigger, and in the

Book III. great boughs and trunk ſcarce is to be found: This gives way for the growth of the inward rings, which at firſt were leſs than the outer, (as may be ſeen in any ſhoot of the firſt year) and after grow thicker, being itſelf abſumed, or converted into wood; as it is certain cartilages or griſtles are into bones, (in the bodies of animals) from which, to ſenſe, they differ even as much as pith from wood.

Theſe rings or ſpaces appearing upon tranſverſe ſection (as they appear elliptical upon oblique, and ſtraight lines upon direct ſection) are no other than the extremities of ſo many integuments, inveſting the whole tree, and, perhaps, all the boughs that are of the ſame age with any of them, or older.

The growth and augmentation of trees, in all dimenſions, is acquired not only by acceſſion of a new integument yearly, but alſo by the reception of nouriſhment into the pores and ſubſtance of the reſt, upon which they alſo become thicker; not only thoſe towards the middle, but alſo the reſt, in a thriving tree: yet the principal growth is between the bark and body, by acceſſion of a new integument yearly, as hath been mentioned; whence the cutting of the bark of any tree or bough round about, will certainly kill it.

The bark of a tree is diſtinguiſhed into rings or integuments, no leſs than the wood, though much ſmaller or thinner, and therefore not diſtinguiſhable, except in the thick barks of great old trees, and toward the inſide next the wood; the outer parts drying and breaking with innumerable fiſſures, growing wider and deeper, as the body of the tree grows bigger, and mouldering away on the outſide.

Though it cannot appear, by reaſon of the continual decay of it, upon the account aforeſaid, yet it is probable the bark of a tree hath had ſucceſſively as many integuments as the wood; and that it doth grow by acquiſition of a new one yearly on the inſide, as the wood doth on the outſide; ſo that the chief way, and conveyance of nouriſhment to both the wood and the bark, is between them both.

The leaſt bud appearing on the body of a tree, doth, as it were, make perforation through the ſeveral integuments to the middle, or very near; which part is, as it were, a root of the bough into the body of the tree,

and after becomes a knot, more hard than the other wood: and when it is larger, manifeſtly ſhewing itſelf alſo to conſiſt of ſeveral integuments, by the circles appearing in it, as in the body: More hard, probably, becauſe ſtraitened in room for growth: as appears by its diſtending, buckling, as it were, the integuments of the wood about it, ſo implicating them the more; whence a knotty piece of wood is ſo much harder to cleave.

It is probable that a cyon or bud, upon graffing or inoculating, doth, as it were, root itſelf into the ſtock in the ſame manner as the branches, by producing a kind of knot.——Thus far the accurate Doctor.

To which permit me to add only (in reference to the circles we have been ſpeaking of) what another curious enquirer ſuggeſts to us; namely, that they are cauſed by the pores of the wood, through which the ſap aſcends in the ſame manner as between the wood and the bark; and that in ſome trees the bark adheres to the wood, as the integuments of wood cleave to one another, and may be ſeparated from each other as the bark from the outwardmoſt; and being thus parted, will be found on their outſides to repreſent the colour of the outermoſt, contiguous to the bark; and on the inner ſides, to hold the colour of the inner ſide of the bark, and all to have a deeper or lighter hue on their inner ſide, as the bark is on that part more or leſs tinged; which tincture is ſuppoſed to proceed from the aſcendant ſap. Moreover, by cutting the branch, the aſcending ſap may be examined as well as the circles. It is probable, the more frequent the circles, the larger and more copiouſly the liquor will aſcend into it; the fewer, the ſooner deſcend from it. That a branch, of three circles, cut off at ſpring, the ſap aſcending, will be found at Michaelmas enſuing when cut again in the ſame branch, or another of equal bigneſs, to have one more than it had at ſpring; and either at ſpring or fall to carry a circle of pricks next the bark; at other ſeaſons a circle of wood only next it. But here the compariſon muſt be made with diſtinction; for ſome trees do probably ſhoot new tops yearly till a certain period, and not after; and ſome have perhaps their circles in their branches decreaſed from their bodies to the extremity of the branch, in ſuch œconomy and order, that, for inſtance, an Apple tree ſhoot of this year has one circle of pricks or wood leſs than the graft of two years growth; and that of two years growth may, the next year, have one circle more than it had the laſt year; but this only till that branch ſhoot no more grafts, and then it is doubtful whether

BOOK III. the outmoſt twig obtains any more circles, or remains at a ſtay, only nouriſhed, not augmented, in the circles. It would alſo be required, whether the circles of pricks increaſe not till Midſummer and after, and the circles of wood from thence to the following ſpring.

I might here ſubjoin the vegetative motion of plants, with the diagrams of the Jeſuit Kircher, where he diſcourſes of their ſtupendous magnetiſms, &c. could there any thing material be added to what has already been ſo ingeniouſly enquired into by the learned Dr. Grew, in his Anatomy of Vegetables, and that of Trunks; where experimentally, and with extraordinary ſagacity, he diſcuſſes this ſubject, (with entire ſatisfaction of the inquiſitive reader) beginning at the ſeeds, and proceeding to the formation of the root, trunk, branches, leaves, flowers, fruit, &c. where you have the moſt accurate deſcriptions of the ſeveral veſſels for ſap, air, juices, with the ſtupendous contexture of all the organical parts, than which there can be nothing more fully entertaining: So that what Dr. Goddard, and other ingenious men have but conjecturally hinted, is by this inquiſitive perſon (and that of the excellent Malpighius) evinced by autoptical experience, and profound reſearch into their anatomy. To all which we may by no means forget the moſt Lyncean inſpector Mr. Ant. Van Leuwenhoek, concerning the barks of trees, which he affirms, and experimentally convinces, that that integument, namely the bark, was produced from the wood, and not the wood from the bark. But this diſcourſe, together with the microſcopical figure, (being too long to be here inſerted) refers to that moſt induſtrious perſon's letter, Tranſact. Numb. 296, p. 1843. Let us therefore proceed to the Felling.

FELLING. It ſhould be in the vigour and perfection of trees (which for the Oak I take to be about the age of fifty, or betwixt that and ſixty years of growth, where the ſoil is natural) that a felling ſhould be celebrated; ſince whilſt our woods are growing it is pity, and indeed too ſoon; and when they are decaying, too late. I do not pretend that a man who has occaſion for timber is obliged to attend ſo many ages e're he fell his trees; but I do by this infer, how highly neceſſary it were that men ſhould perpetually be planting, that ſo poſterity might have trees fit for their ſervice, of competent, that is, of a middle growth and age, which it is impoſſible they ſhould have, if we thus continue to deſtroy our woods, without this providential planting in their ſtead, and felling what we do cut down with great diſcretion and regard of the future.

I know it is an objection, or rather an unreaſonable excuſe of the ſloth-ful neglect of ſucceſſive and continual planting, that the expectation is tedious of what is not likely to be timber in our time: But this is quite otherwiſe, provided men would be earlier at the work, for they might have ſufficient of their own planting (nay, from the very rudiment and ſeeds) abundantly to recompenſe their patience and attendance, living to the age men uſually attain by the common courſe of nature; and with how much improvement to their children and poſterity. This minds me of what is reported of the Emperor Maximilian II. who by chance finding an antient huſbandman ſetting Date-ſtones, he aſked him what his meaning was to plant a tree that required an hundred years before it bore fruit. Sir, replies the good man, I have children, and they may have more come after them. At which the Emperor was ſo well pleaſed, that he gave him an hundred florins. Was not this like that of Laertes to Ulyſſes?

But before we go farther with the hiſtory of the ſtature and magnitude of trees, we are not to conclude as if all thoſe trees and plants, which arrive to that enormous ſtature and bulk we have mentioned, were not to be found in other countries, both of the ſame and other ſpecies; but that even thoſe exoticks, and divers of our own, which ſeem pigmies and dwarfs, compared to thoſe giants in their native climate, are ſo much greater than in ours; ſince we find what we account but ſhrubs, are divers of them well-grown trees, and proſper into uſeful timber; ſuch as Juniper, (emulating the tall Cedar) Sabine, Tamariſk, Cornel, Phillyrea, Granade, Lentiſcus, Thuya, Laurel, Bays, and even Roſemary, (and other frutexes and lignous plants) ſuperior in growth and ſtature (than with us) where they ſpontaneouſly emerge. Thus not only the White-Mulberry wonderfully outſtrips ours, but thoſe of much ſmaller ſtature. The Arbutus, growing on Mount Athos, becomes a ſpreading tree. The Cypreſs in Candy comes to timber, fit for vaſt beams and planks of four feet breadth. The Larch over-tops the Fir. Even the Myrtle, with us but a buſh, makes ſtaves for ſpears. The Oleander, *& Humilis Geniſta*, nay, the Rhododendron, make poſts and rafters. Even herbaceous Sufrutages, and amongſt the culinary furniture, a grain of Muſtard has ſprung up to a tree, whoſe branches afforded harbour to the birds of the air; and the very Hyſſop made the ſtalk that carried a ſponge to the mouth of our bleſſed Lord on the croſs. We are told by Joſephus, in Macherontis's reign, there was growing a plant of Rue, equal for height and thickneſs to any Fig tree; it was ſtill remaining in the time of Herod,

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and would have ſtood longer, had not the Jews cut it down. Joſ. Antiq. Bell. Jud. lib. vii. cap. xxxviii. How theſe, and indeed all other vegetables differ in the north from thoſe of the ſouth, growing on the ſame mountain, Monſieur Brenier has ſhewn us; ſome are nipt and ſtarved with that *penetrabile frigus* and others ruined by the ſcorching heat, quite changing almoſt their very nature and conſtitution; ſome of them are dry, yielding nothing but leaves; others of the ſame ſpecies are gummy, juicy, and ſucculent. The Lentiſcus yields Maſtich in Cio; in Italy, the Oak bears Galls; and the Fraxinus exſudes Manna in Calabria: Thus do Cœlum and Solum govern the vegetable kingdom, for the mutual ſupply of the moſt uſeful productions, eſpecially thoſe of the foreſt, without which there could be no commerce in the world; for ſo has Providence ordained. But to return to felling.

Such as we ſhall perceive to decay, ſhould firſt be picked out for the ax, and then thoſe which are in their ſtate, or approaching to it; but the very thriving, and manifeſtly improving, ſhould be indulged as much as poſſible. To explore the goodneſs and ſincerity of a ſtanding tree, is not the eaſieſt thing in the word: We ſhall anon have occaſion to mention my Lord Bacon's experiment to detect the hollowneſs of timber: But there is doubtleſs none more infallible than the boring it with a middling piercer made augur-faſhion, and by frequent pulling out, and examining what ſubſtance comes along with it, as thoſe who bore the earth to explore what minerals the place is impregnated with, and as ſound cheeſes are taſted: Some again there are who, by digging a little about the roots, will pronounce ſhrewdly concerning the ſtate of a tree; and if they find him periſhed at the top, (for trees die upwards, as men do from the feet) be ſure the cauſe lies deep, for it is ever a mark of great decay in the roots. There is alſo a ſwelling vein, which diſcovers itſelf eminently above the reſt of the ſtem, though, like the reſt, inveſted with bark, and which frequently circles about and embraces the tree, like a branch of Ivy, which is an infallible indication of hollowneſs and hypocriſy within.

The time of the year for this deſtructive work is not uſually till about the end of April, (at which ſeaſon the ſap does commonly riſe freely) though the opinions and practice of men have been very different: Virtruvius is for an autumnal fall; others adviſe December and January. Cato was of opinion trees ſhould have firſt borne their fruit, or at leaſt, not till full ripe; which agrees with that of the architect, who begins his fall

from the commencement of autumn to the ſpring, when Favonius begins to breathe; and his reaſon is, that from thence, during all the ſummer, trees are as it were going with child, and diverting all their nouriſhment to the embryo, leaves, and fruit, which renders them weak and infirm. This he illuſtrates from teeming women, who during their pregnancy are never ſo healthful as after they are delivered of their burden, and abroad again; and for this reaſon, (ſays he) thoſe merchants who expoſe ſlaves to ſale, will never warrant one that is with child: the buyer was (it ſeems) to ſtand to the hazard. Thus he: But I remember Monſieur Perrault in his pompous edition of our author, and learned notes upon this chapter, reproves the inſtance, and corrects the text, *à diſparatione procreationis, &c.* to *ad diſparationem, &c.* affirming that women are never more ſound and healthy than when they are pregnant; the nutrition derived to the infant being (according to him) no diminution or prejudice to the mother, as being but the conſumption of that humidity which enfeebles the bearing woman; and thence infers, that the compariſon cannot hold in trees, which become ſo much ſtronger by it. But to inſiſt no longer on this; there is no doubt, that whilſt trees abound in over-much, crude, and ſuperfluous moiſture, (though it may, and do contribute to their production and fertility) they are not ſo fit for the ax as when being diſcharged of it, and that it riſes not in that quantity as to keep on the leaves and fruit, thoſe laxed parts and veſſels by which the humour did aſcend, grow dry and cloſe, and are not ſo obnoxious to putrefaction and the worm. Hence it is that he cautions us to take notice of the moon's decline, becauſe of her dominion over liquids, and directs our Woodman (ſome days before he fells downright) to make the gaſh or overture *uſque ad mediam medullam*, to the end the whole moiſture may exſtil, for that not only by the bark (which thoſe who reſemble trees to animals will have to be analogous to arteries) does the juice drain out, but by that more fatty and whiter ſubſtance of the wood itſelf, immediately under the bark, (and which our carpenters call the ſap, and therefore hew away as ſubject to rot) which they will have to be the veins: It is (ſay they) the office of theſe arteries of bark, receiving nouriſhment from the roots, to derive it to every part of the tree, and to remand what is crude and ſuperfluous by the veins to the roots again; whence, after it has been better digeſted, it is made to aſcend a ſecond time by the other veſſels in perpetual circulation; and therefore neceſſary ſo deep an inciſion ſhould be made as may ſerve to exhauſt both the venal and arterial moiſture: But for this nice ſpeculation, I refer the curious to the already mentioned Dr. Grew, and to the learned Malpighius,

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who have made other, and far more accurate obſervations upon this ſubject. In the mean time, as to that of the worm in timber-trees, and their rotting, ſometimes within, and ſometimes without; obſerve that ſuch as gape and rift outwardly, (as does that of the Oak when felled) the ſap thereby let out, the timber and heart within is found to be much more ſolid than that of the Cheſnut and other trees who keep the moiſture within; in theſe, however ſeeming ſound outwardly, the timber is frequently extremely rotted and periſhed. Laſtly, concerning the bark, though ſome are for ſtripping it, and ſo to let the tree ſtand till about Mid-June, to preſerve it from the worm (all which time it will put forth leaves, and ſeemingly flouriſh); yet that which is unbarked is more obnoxious to them, and contracts ſomewhat a darker hue (which is the reaſon ſo many have commended the ſeaſon when it will moſt freely ſtrip); however, this were rather to be conſidered for ſuch trees as one would leave round and unſquared, ſince we find the wild Oak, and many other ſorts, felled over late, and when the ſap begins to grow proud, to be very ſubject to the worm; whereas, being cut about mid-winter, it neither caſts, rifts, nor twines, becauſe the cold of the winter does both dry and conſolidate; whiles in ſpring, and when pregnant, ſo much of the virtue goes into the leaves and branches. Happy therefore were it for our timber, ſome real invention of tanning without ſo much bark (as the Hon. Mr. Charles Howard has moſt ingeniouſly offered) were become univerſal, that trees being more early felled, the timber might be better ſeaſoned and conditioned for its various uſes *. But as the cuſtom is, men have now time to fell their woods, even from mid-winter to the ſpring, but never any after the ſummer ſolſtice.

And now we ſpeak of tanning, they have in Jamaica the Mangrave, Olive, and a third whoſe barks tan much better than do ours in England, ſo as in ſix weeks the leather is fit to be employed to any uſe: They have likewiſe there a tree whoſe berries waſh better and whiter than any Caſtile ſoap.

NOTES.

* Monſ. Buffon very juſtly obſerves, that the trees intended to be felled for ſervice ſhould firſt be ſtripped round of their bark, and then ſuffered to ſtand and die upon the ſpot before they are cut: By this means the ſappy part, or blea of the tree, becomes as hard and firm as the heart, and the real ſtrength and denſity of the wood has been proved, by many experiments, to be greatly increaſed by it.

Then for the age of the moon, it has religiouſly been obſerved; ſo that Diana's Preſidency in Sylvis was not ſo much celebrated to credit the fictions of the Poets, as for the dominion of that moiſt planet, and her influence over timber: However, experienced men commend the felling ſoon after a full moon, and ſo during all the decreaſe, and to let the tree lie at leaſt three months, to render the timber ſtrong and ſolid: For my part, I am not ſo much inclined to theſe criticiſms, that I ſhould altogether govern a felling at the pleaſure of this mutable Lady; however, there is doubtleſs ſome regard to be had:

> Nec fruſtra ſignorum obitus ſpeculamur & ortus.
>
> Nor is't in vain ſigns fall and riſe to note.

As to other more recondit and deep aſtrological obſervations, minute and ſcrupulous, they are, perhaps, not altogether to be rejected, both as to the various configurations of the ſuperior bodies, and operation on both vegetable and ſenſitive, eſpecially as to the growth of fruit, ſowing, planting, and cultivating (indicating the proper ſeaſons, according to the acceſs and receſs of the greater luminaries through the zodiack): It were ingratitude to impute it all to the ſuperſtition of the antients, or the total ignorance of cauſes in thoſe great and learned men (ſuch as Heſiod, Virgil, Cato, Varro, Columella, Pliny, and the reſt) who have ſo freely left us theſe leſſons; doubtleſs from their long experience, and extraordinary penetration and enquiry into nature. Let the curious then, for his better ſatisfaction, conſult that learned treatiſe of judicial aſtrology, written by Sir Chriſtopher Heydon.

In the mean time the old rules are theſe:

Fell in the decreaſe, or four days after the conjunction of the two great luminaries: ſome the laſt quarter of it; or (as Pliny) in the very article of the change, if poſſible, which happening, ſaith he, in the laſt day of the winter ſolſtice, that timber will prove immortal: At leaſt it ſhould be from the twentieth to the thirtieth day, according to Columella: Cato four days after the full, as far better for the growth, nay, Oak in the ſummer; but all vimineous trees *ſilente lunâ*, ſuch as Sallows, Birch, Poplar, &c. Vegetius for ſhip-timber, from the fifteenth to the twenty-fifth; the moon as before: But never during the increaſe, trees being then moſt abounding

BOOK III. with moiſture, which is the only ſource of putrefaction: And yet it is affirmed upon unqueſtionable experience, that timber cut at any ſeaſon of the year, in the old moon, or laſt quarter, when the wind blows weſterly, proves as ſound and good as at any other period whatſoever; nay, all the whole ſummer long, as in any month of the year, eſpecially trees that bear no fruit. Theophraſtus will have the Fir, Pine, and Pitch tree felled when firſt they begin to bud: I enumerate them all, becauſe it may be of great uſe on ſome publick emergencies.

Then for the temper and time of day: The wind low, neither eaſt nor weſt, (but weſt of the two) the eaſt being moſt pernicious, and expoſing it to the worms, and for which the beſt cure is, the plentiful ſobbing it in water; neither in froſty, wet, or dewy weather; and therefore never in a forenoon, but when the ſeaſon has been a good while dry and calm; for as the rain ſobs it too much, ſo the wind cloſes and obſtructs the moiſture from ouſing out. Laſtly, touching the ſpecies: Fell Fir when it begins to ſpring; not only becauſe it will then beſt quit its coat and ſtrip, but for that they hold it will never decay in water; which howſoever Theophraſtus deduces from the old bridge made of this material over a certain river in Arcadia, cut in this ſeaſon, is hardly ſufficient to ſatisfy our enquiry.

Previous to this work of felling is the advice of our countryman Markham, and it is not to be rejected: Survey, ſaith he, your woods as they ſtand, immediately after Chriſtmas, and then divide the ſpecies in your mind, (I add rather in ſome note-book or tables) and conſider for what purpoſes every ſeveral kind is moſt uſeful, which you may find in the ſeveral Chapters of this Diſcourſe under every head. After this reckon the bad and good together, ſo as one may put off the other, without being forced to glean your woods of all your beſt timber. This done, or before, you ſhall acquaint yourſelf with the marketable prices of the country where your fell is made, and that of the ſeveral ſorts; as what ſo many inches or feet ſquare, and long, is worth for the ſeveral employments: What planks, what other ſcantlings, for ſo many ſpoaks, naves, rings, pales, poles, ſpurs, &c. as ſuppoſe it were Aſh, to ſet apart the largeſt for the Wheel-wright, the ſmalleſt for the Cooper, and that of ordinary ſcantling for the plows, and the bruſh to be kidded and ſold by the hundred or thouſand, and ſo all other ſorts of timber, viz. large, middling ſtuff and poles, &c. allowing the waſte for the charges of felling, &c. all which you

ſhall compute with greater certainty, if you have leiſure, and will take the pains to examine ſome of the trees, either by your own fathom, or (more accurately) by girting them about with a ſtring, and ſo reducing them to the ſquare, &c. by which means you may give a near gueſs; or, you may mark ſuch as you intend to fell; and then begin your ſale about Candlemas till the ſpring; before which you muſt not (according as our cuſtom is) lay he ax to the root; though ſome for particular employments, as for timber to make plows, carts, axle-trees, naves, harrows, and the like huſbandry-tools, do frequently cut in October.

Being now entering with your workmen, one of the firſt and moſt prinpal things is, the ſkilful diſbranching of the bole of all ſuch arms and limbs as may endanger it in the fall, wherein much forecaſt and ſkill is required of the woodman, ſo many excellent trees being utterly ſpoiled for want of this only conſideration; and therefore in arms of timber which are very great, chop a nick underneath cloſe to the bole, ſo meeting it with downright ſtrokes, the arm will be ſevered without ſplicing.

We have ſhewed why ſome, four or five days before felling, bore the tree croſs-way; others cut a kerf round the body, almoſt to the very pith or heart, and ſo let it remain a while; by this means to drain away the moiſture, which will diſtil out of the wounded veins, and is chiefly proper for the moiſter ſort of trees: and in this work the very ax will tell you the difference of the ſex, the male being ſo much harder and browner than the female: But here (and where-ever we ſpeak thus of plants) you are to underſtand the analogical, not proper diſtinctions.

But that none may wonder why in many authors, of good note, we find the fruit-bearers of ſome trees called Males, and not rather Females, as particularly the Cypreſs, I ſhall obſerve that this prepoſterous denomination had its ſource from very antient cuſtom, and was firſt begun in Egypt, (Diodorus ſays in Greece) where we are told, that the father only was eſteemed the ſole author of generation; the mother contributing only receptacle and nutrition to the offspring, which legitimated their mixtures as well with their ſlaves as free-women: And upon this account it was, that even trees bearing fruit, were amongſt them reputed males, and the ſterile and barren ones females; and we are not ignorant how learnedly this doctrine has been lately revived by ſome of our moſt celebrated Phyſicians:

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But ſince the ſame arguments do not altogether quadrate in trees, where the coition is not ſo ſenſible, (whatever they pretend of the Palms) I am of opinion we might with more reaſon call that the Female which bears any eminent fruit, ſeed or egg, (from whence animals, as well as trees, not excepting Man himſelf, as the learned Steno, Swammerdam, and others have, I think, undeniably made out) and them Males which produce none. But ſometimes too the rudeneſs or leſs aſperity of the leaves, bark, and grain, nay, their medical operations, may deſerve the diſtinction; to which Ariſtotle adds branchineſs, leſs moiſture, quick maturity, &c. lib. i. de Plin. cap. iii. All which ſeems to be moſt conſpicuous in Plum trees, Hollies, Aſhes, Quince, Pears, and many other ſorts; not to inſiſt on ſuch as may be compelled even to change, as it were, their ſex, by graffing and artificial improvements: For whatever we are told of ſuch evident diſtinction of ſexes in ſome *(Malus Medica, &c.* *) I look upon it as happening rather through ſome accidental protruſion, artificial exuberance, or depreſſion, than conſtant and natural.——But I return to Felling.

* Maris enim pomum adnatum habet quoddam veluti infantis genitale ejuſdem cum pomo corticis et coloris; Fœminæ muliebre pudendum ad veram ejus effigiem efformatum videtur, quo ſimile magis ſculptor non fingat. Maranch, lib. xi. cap. xi.

When this is performed you ſhould leave the ſtools as cloſe to the ground as poſſible may be, eſpecially if you deſign a renaſcency from the roots; unleſs you will grub for a total deſtruction, or the uſe of that part we have already mentioned, ſo far ſuperior in goodneſs to what is more remote from the root, and beſides the longer you cut and convert the timber, the better for many uſes. Some are of opinion, that the ſeedling Oak ſhould never be cut to improve his bole; becauſe, ſay they, it produces a reddiſh wood, not acceptable to the workman; and that the tree which grows on the head of his mother, does ſeldom prove good timber: It is obſerved, indeed, that one foot of timber near the root (which is the proper kerf, or cutting place) is worth three farther off; though I know divers who think otherwiſe: And haply, the ſucceſſor is more apt to be tender than what was cut off to give it place; but let this be enquired into at leiſure. If it be a winter-fell for fuel, proſtrate no more in a day than the cattle will eat in two days, I mean of the browſe-wood; and when that is done, kid, and ſet it up an end, to preſerve it from rotting.

Dr. Plot recommends the diſbranching to be done in the ſpring before felling, whilſt the tree is ſtanding; that is, from May to Michaelmas, and ſo to let it continue till the next ſpring, and diſburden them when felled, as the cuſtom is in Staffordſhire and the North, for exceedingly contributing to a dry ſeaſoning, freeing it from the attack of worms and other

accidental corruption; and thinks that the prejudice accruing thereby, as to the Tanner, (in regard of the more difficult excortication) is no way to be put in balance with the advantage and improvement of the timber for paling, building of ſhips, houſes, &c; accounting this method of that univerſal importance, as to merit the deliberation of a parliament: In the meanwhile, by whatever method you proceed as to this, when once a tree is proſtrate, and the bark ſtripped off, let it ſo be ſet as it may be beſt dry; then cleanſe the bole of the branches which were left, and ſaw it into lengths for the ſquaring, to which belong the meaſure and girth, as our workmen call it, which I refer to the buyer, and to many ſubſidiary books lately printed, wherein it is taught by a very familiar mechanical calcule and eaſy method.

But by none, in my apprehenſion, ſet forth in a more facile and accurate way, than what that induſtrious mathematician, Mr. Leybourn, has publiſhed, in his late *Line of Proportion made Eaſy*, and other his labours; where he treats as well of the ſquare as the round, as it is applicable to boards and ſuperficials, and to timber which is hewed, or leſs rough, in ſo eaſy a method, as nothing can be more deſired. I know our ordinary Carpenters, &c. have generally upon their rulers a line, which they uſually call Gunter's Line; but few of them underſtand how to work from it as they ſhould: And divers Country Gentlemen, Stewards, and Woodmen, when they are to meaſure rough timber upon the ground, conſide much to the girt, which they do with a ſtring, at about four or five feet diſtance from the root or great extreme; of the ſtring's length, they take a quarter for the true ſquare, which is ſo manifeſtly erroneous, that thereby they make every tree, ſo meaſured, more than a fifth part leſs than really it is. This miſtake ſhould therefore be reformed; and it were, I conceive, worth the ſeller's while to inſpect it accordingly: Their argument is, that when the bark of a tree is ſtripped, and the body hewed to a ſquare, it will then hold out no more meaſure; that which is cut off being only fit for fuel, and the expence of ſquaring coſts more than the chips are worth. To convince them of this error, I ſhall refer and recommend them to the above-named author; and to what the induſtrious Mr. Cooke has ſo mathematically demonſtrated: Where alſo of taking the altitude of trees, the better to judge of the worth of them, with the meaſuring of wood-lands, &c. together with neceſſary calculations for the levelling of ground, and removing of earth, drawing of plots and figures; all which are very conducible to the ſeveral arguments of this ſilvan work. But to proceed:

BOOK III.

If you are to remove your timber, let the dew be firſt off, and the ſouth wind blow before you draw it; neither ſhould you by any means put it to uſe for three or four months after, (ſome not till as many years) unleſs great neceſſity urge you, as it did Duilius, who, in the firſt Punic War, built his fleet of timber before it was ſeaſoned, being not above two months from the very felling to the launching; the navy of Hiero was forty-five days from the foreſt to the ſea, and that of Scipio, in the ſecond Carthaginian War, only forty. July is a good time for bringing home your felled timber; but concerning the time and ſeaſon of felling, a juſt treatiſe might be written: Let the learned therefore conſult Vitruvius, particularly on this ſubject, lib. ii. cap. ix. Alſo M. Cato, cap. xvii. Plin. lib. xvi. cap. xxxix. Conſtantinus and Heron. lib. iii. de R. R. Veget. lib. iv. cap. xxxv. Columella, lib. iii. cap. ii. but eſpecially the moſt ample Theophraſtus φυτῶν ἱστορίας lib. v. Note, That a ton of timber is forty ſolid feet, and a load fifty.

To make excellent boards and planks, it is the advice of ſome, you ſhould bark your trees in a fit ſeaſon, and ſo let them ſtand naked a full year before the felling; and in ſome caſes and grounds it may be profitable: But let theſe, with what has been already ſaid in the foregoing chapters of the ſeveral kinds, ſuffice for this article. I ſhall add one advertiſement of caution to thoſe noble perſons and others who have groves and trees of ornament near their houſes, and in their gardens in London, and the circle of it, eſpecially if they be of great ſtature, and well grown, (ſuch as were lately the groves in the ſeveral Inns of Court, nay, even that comparatively new plantation in my Lord of Bedford's Garden *, and where-ever they ſtand in the more interior parts of this city) that they be not over haſty, or by any means perſuaded to cut down any of their old trees, upon hope of new more flouriſhing plantations, thickening, or repairing deformities, becauſe they grew ſo well when firſt they were ſet: It is to be conſidered how exceedingly that pernicious ſmoak of the ſea-coal is increaſed in and about London ſince they were firſt planted, and the buildings invironing them, and incloſing it in amongſt them, which does ſo univerſally contaminate the air, that what plantations of trees ſhall be now begun in any of thoſe places, will have much ado, great difficulty, and require a long time to be brought to any tolerable perfection: Therefore let them make much of what they have; and though I diſcourage none, yet I can animate none to cut down the old.

* Since the firſt publication of this diſcourſe, moſt of thoſe groves and trees have been cut down, to give place for buildings, and turned into ſtreets.

And here might now come in a pretty ſpeculation, what ſhould be the reaſon after general fellings, and extirpations of vaſt woods of one ſpecies, the next ſpontaneous ſucceſſion ſhould be of quite a different ſort? We ſee indeed ſomething of this in our gardens and corn-fields, as the beſt of poets witneſſeth, but that may be much imputed to the alteration, by improvement, or detriment of the ſoil, and other accidents. Whatever the cauſe may be, ſince it appears not from any univerſal decay of nature, (ſufficiently exploded) I ſhall only here produce matter of fact, and that it ordinarily happens. As in ſome goodly woods formerly belonging to my grandfather, that were all of Oak, after felling they univerſally ſprung up Beech; and it is affirmed, by general experience, that after Beech, Birch ſucceeds, as in that famous wood at Darnway, on the river Findorn in the province of Murray in Scotland, where nothing had grown but Oak in a wood three miles in length; and haply more ſoutherly, it might have been Beech, and not Birch till the third degradation. Birches familiarly grow out of old and decayed Oaks; but whence this ſympathy and affection ſhould proceed, is more difficult to reſolve, in aſmuch as we do not detect any ſo prolifical and eminent ſeed in that tree. Some accidents of this nature may be imputed to the winds and the birds which frequently have been known to waft and convey ſeeds to places widely diſtant, as we have touched in the chapter of Firs. Holly has been ſeen to grow out of Aſh, as Aſh out of ſeveral trees; and I have it confidently aſſerted by perſons of undoubted truth, that they have ſeen a tree cut in the middle, whoſe heart was Aſh-wood, and the exterior part Oak, and this in Northamptonſhire. And why not as well (though with ſomething more difficulty) as through a Willow, whoſe body (as is noted) it has been obſerved to penetrate even to the earth? Detruding the Willow quite out of its place, of which a pretty emblem might be conceived. But I purſue theſe inſtances no farther.

The fallen leaves of trees in woods, which lie ſometimes very thick and deep, ſhould be raked and ſhoveled up; being dry, are very uſeful for the covering of tender kitchen-garden plants, in winter, inſtead of litter; and the reſt, if buried in ſome hole to rot, when dried and reduced to powder, become excellent mould. I wonder this huſbandry is ſo much neglected.

CHAP. IV.

Of TIMBER, *the* SEASONING *and* USES, *and of* FUEL.

Book III. Seasoning

SINCE it is certain and demonſtrable, that all arts and artiſans whatſoever muſt fail and ceaſe, if there were no timber and wood in a nation, (for he that ſhall take his pen, and begin to ſet down what art, myſtery, or trade belonging any way to human life, could be maintained and exerciſed without wood, will quickly find that I ſpeak no paradox) I ſay, when this ſhall be well conſidered, it will appear, that we had better be without gold than without timber: This contemplation, and the univerſal uſe of that precious material (which yet is not of univerſal uſe till it be duly prepared) has moved me to deſign a ſolemn chapter for the ſeaſoning, as well as to mention ſome farther particular application of it. The firſt and chiefeſt uſe of timber was, doubtleſs, for the building of houſes and habitations to ſhelter men in: It is in the firſt chapter of the ſecond book, that Vitruvius ſhews, in what ſimple and plain manner our firſt progenitors erected their humble cottages; when, like thoſe of Colchis in Pontus, they began to creep out of the ſubterranean and cavernous rocks, and laid the firſt groundſil upon which they placed the upright poſts, and rudely framed a pointed roof, *Arboribus perpetuis planis*, (on which the critics have vext their reſearches) and from which mean beginning, all the ſuperb and pompous effects of architecture have proceeded: But to purſue our title, we have before ſpoken concerning ſome preparations of ſtanding trees deſigned for timber, by a half cutting, diſbarking, and the ſeaſons of drawing and uſing it.

Lay up your timber very dry, in an airy place, (yet out of the wind or ſun) and not ſtanding upright, but lying along, one piece upon another, interpoſing ſome ſhort blocks between them, to preſerve them from a certain mouldineſs, which they uſually contract while they ſweat, and which frequently produces a kind of fungus, eſpecially if there be any ſappy parts remaining.

Some there are yet, who keep their timber as moiſt as they can, by ſubmerging it in water, where they let it imbibe, to hinder the cleaving; and this is good in Fir, both for the better ſtripping and ſeaſoning; yea, and not only in Fir, but other timber: Lay therefore your boards a fortnight

in the water, (if running, the better, as at ſome mill-pond head) and then ſetting them upright in the ſun and wind, ſo as it may freely paſs through them, (eſpecially during the heats of ſummer, which is the time of finiſhing buildings) turn them daily, and, thus treated, even newly ſawn boards will floor far better than a many years dry ſeaſoning, as they call it. But to prevent all poſſible accidents, when you lay your floors, let the joints be ſhot, fitted, and tacked down only for the firſt year, nailing them for good and all the next; and by this means they will lie ſtaunch, cloſe, and without ſhrinking in the leaſt, as if they were all of one piece; and upon this occaſion I am to add an obſervation which may prove of no ſmall uſe to builders; that if one take up deal boards that may have lain in the floor an hundred years, and ſhoot them again, they will certainly ſhrink *(toties quoties)* without the former method. Amongſt Wheel-wrights, the water-ſeaſoning (which hinders the exhaling of the alkali ſalt in it) cauſing the hardneſs, is of eſpecial regard, and in ſuch eſteem amongſt ſome, that I am aſſured the Venetians, for their proviſion in the arſenal, lay their Oak ſome years in water before they employ it. Indeed the Turks not only fell at all times of the year, without any regard to the ſeaſon, but employ their timber green and unſeaſoned; ſo that tho' they have excellent Oak, it decays in a ſhort time by this only neglect.

Elm felled ever ſo green for ſudden uſe, if plunged four or five days in water (eſpecially ſalt water) obtains an admirable ſeaſoning, and may immediately be uſed. I the oftener inſiſt on this water-ſeaſoning, not only as a remedy againſt the worm, but for its efficacy againſt warping and diſtortions of timber, whether uſed within, or expoſed to the air. Some again commend burying in the earth, others in wheat; and there be ſeaſonings of the fire, as for the ſcorching and hardening of piles, which are to ſtand either in the water or the earth:

> Et ſuſpenſa focis explorat robora fumus. GEORG. i.
>
> ——————————— the Oak
> Explore, ſuſpended in the chimney ſmoak:

For that to moſt timber it contributes much to its duration. Thus do all the elements contribute to the art of ſeaſoning. The learned Interpreter of Antonio Neri's Art of Glaſs, cap. v. ſpeaking of the difference of vegetables, as they are made uſe of at various ſeaſons, obſerves from the

BOOK III. Button-mould-makers, in thoſe woods they uſe, that Pear tree, cut in ſummer, works tougheſt, but Holly in the winter; Box hardeſt about Eaſter, but mellow in the ſummer; Hawthorn kindly about October, and Service tree in ſummer.

And yet even the greeneſt timber is ſometimes deſirable for ſuch as carve and turn, but it choaks the teeth of our ſaws; and for doors, windows, floors, and other cloſe works, it is altogether to be rejected, eſpecially where Walnut tree is the material, which will be ſure to ſhrink: Therefore it is beſt to chooſe ſuch as is of two or three years ſeaſoning, and that is neither moiſt nor over dry; the mean is beſt. Sir Hugh Platt informs us, that the Venetians uſe to burn and ſcorch their timber in a flaming fire, continually turning it round with an engine, till they have gotten upon it an hard, black, coaly cruſt, and the ſecret carries with it great probability; for the wood is brought by it to ſuch a hardneſs and dryneſs, *ut cùm omnis putrefactio incipiat ab humido*, that neither earth nor water can penetrate it; I myſelf remembering to have ſeen charcoal dug out of the ground amongſt the ruins of antient buildings, which had in all probability lain covered with earth above fifteen hundred years.

Timber which is cleft is nothing ſo obnoxious to rift and cleave as what is hewn; nor that which is ſquared, as what is round: and therefore where uſe is to be made of huge and maſſy columns, let them be bored through from end to end; it is an excellent preſervative from ſplitting, and not unphiloſophical; though to cure this accident painter's putty is recommended, alſo the rubbing them over with a wax-cloth is good; or before it be converted, the ſmearing the timber over with cow-dung, which prevents the effects both of ſun and air upon it, if of neceſſity it muſt lie expoſed: But beſides the former remedies, I find this, for the cloſing of the chops and clefts of green timber, to anoint and ſupple it with the fat of powdered-beef broth, with which it muſt be well ſoaked, and the chaſms filled with ſponges dipt into it; this to be twice done over. Some Carpenters make uſe of greaſe and ſaw-duſt mingled; but the firſt is ſo good a way, ſays my author, that I have ſeen wind-ſhock timber ſo exquiſitely cloſed, as not to be diſcerned where the defects were: This muſt be uſed when the timber is green.

We ſpake before of ſquaring; and I would now recommend the quartering of ſuch trees as will allow uſeful and competent ſcantlings, to be of

much more durableneſs and effect for ſtrength, than where (as cuſtom is, and for want of obſervation) whole beams and timbers are applied in ſhips or houſes, with ſlab and all about them, upon falſe ſuppoſitions of ſtrength beyond theſe quarters: For there is in all trees an evident interſtice, or ſeparation between the heart and the reſt of the body, which renders it much more obnoxious to decay and miſcarry, than when they are treated and converted as I have deſcribed it; and it would likewiſe ſave a world of materials in the building of great ſhips, where ſo much excellent timber is hewed away to ſpoil, were it more in practice. Finally:

I muſt not omit to take notice of the coating of timber in work, uſed by the Hollanders, for the preſervation of their gates, portculliſes, draw-bridges, ſluices, and other huge beams and contignations of timber expoſed to the ſun and perpetual injuries of the weather, by a certain mixture of pitch and tar, upon which they ſtrew ſmall pieces of cockle, and other ſhells, beaten almoſt to powder, and mingled with ſea-ſand, or the ſcales of iron, beaten ſmall and ſifted, which incruſts, and arms it after an incredible manner againſt all theſe aſſaults and foreign invaders; but if this ſhould be deemed more obnoxious to firing, I have heard that a waſh made of allum has wonderfully protected it againſt the aſſaults even of that devouring element; and that ſo a wooden tower or fort at the Piræum, an Athenian Port, was defended by Archelaus, a Commander of Mithridates, againſt the great Sylla: But you have ſeveral compoſitions for this purpoſe in that incomparable Treatiſe of Naval Architecture, written in the Low-Dutch by N. Witſen, part i. chap. v. The book is in folio, and he that ſhould well tranſlate it into our language (which I much wonder has not yet been done) would deſerve well of the publick.

Timber that you have occaſion to lay in mortar, or which is in any part contiguous to lime, as doors, window-caſes, groundſils, and the extremities of beams, &c. have ſometimes been capped with molten pitch, as a marvellous preſerver of it from the burning and deſtructive effects of the lime; but it has ſince been found rather to heat and decay them, by hindering the tranſudation which thoſe parts require; better ſupplied with loam or ſtrewings of brick-duſt, or pieces of boards; ſome leave a ſmall hole for the air. But tho' lime be ſo deſtructive whilſt timber lies thus dry, it ſeems they mingle it with hair, to keep the worm out of ſhips which they ſheath for ſouthern voyages; though it is held much to retard

Book III.

their courſe: Wherefore the Portugueze ſcorch them with fire, which often proves very dangerous; and indeed their timber being harder, is not ſo eaſily penetrable; and therefore have ſome been thinking of finding out ſome tougher ſorts of materials, eſpecially of a bitter ſap; ſuch as is reported to be the wood of a certain Indian Pear: and ſome talk of a lixivium to do the feat; others of a pitchy ſubſtance to be extracted out of ſea-coal; but nothing has yet been found more expedient, than the late application of thin lamins of ſheet-lead, if that alſo be no impediment to ſailing: However, there are many kinds of wood in the Weſtern-Indies (beſides the Acajou) that breed no worms, and ſuch is the White Wood of Jamaica, proper enough to build ſhips. In the mean time, let me not omit what the learned Dr. Liſter, in his Notes upon Godarius of Inſects, ſays, That he is perſuaded there could not be a more probable expedient to diſcover what kind of timber were beſt for ſheathing, than to tie certain poliſhed pieces of wood (cut like tallies) to a buoy, in ſome waters and ſtreams much infeſted with the worms; for that ſort of wood which the worm ſhould refuſe, would in all reaſon be choſen for the uſe deſired. The Indies being ſtored with greater varieties of timber than Europe, it were probable there might ſome be found, which that kind of river-worm will never attack.

For all uſes, that timber is eſteemed the beſt which is the moſt ponderous, and which, lying long, makes deepeſt impreſſion in the earth, or in the water, being floated; alſo what is without knots, yet firm, and free from ſap; which is that fatty, whiter, and ſofter part, called by the antients Alburnum, which you are diligently to hew away: Here we have much ado about the Torulus of the Fir and the Φλοιώδης κύκλος, by both Vitruvius and Theophraſtus, which I paſs over. You ſhall perceive ſome which has a ſpiral convolution of the veins; but it is a vice proceeding from the ſeverity of unſeaſonable winters, and defect of good nutriment.

My Lord Bacon, Exper. 658, recommends for trial of a ſound or knotty piece of timber, to cauſe one to ſpeak at one of the extremes to his companion liſtening at the other; for if it be knotty, the ſound, ſays he, will come abrupt.

Moreover, it is expedient that you know which are the veins and which the grain in timber, (whence the term *fluviari arborem*) becauſe of the difficulty of working againſt it: Thoſe therefore are counted the veins

which grow largeſt, and are ſofter, for the benefit of cleaving and hewing: *that* the grain, or pectines, which runs in waves, and makes the diverſe and beautiful chamfers which ſome woods abound in to admiration. The Fir tree, horizontally cut, has two circles of different fibres, which (when the timber comes to be cleft in the middle) ſeparate into four different waves, whence Pliny calls them *quadrifluvios*, and it is to be noted, that the nodous, and knotty part of theſe ſort of trees, is that only which grows from the firſt boughs to the ſummit, or top, by Vitruvius termed the *Fuſterna*, which both Baldus and Salmaſius derive *à Fuſte*. The other clean part, free of theſe boils, (being that which, when the ſappy ſlab is cut away, is the beſt) he calls *Sapinea*. Finally, the grain of Beech runs two contrary ways, and is therefore to be wrought accordingly; and indeed the grain of all timber ought well to be obſerved; ſince the more you work according to it, eſpecially in cleaving, and the leſs you ſaw, the ſtronger will be your work.

Here it may be fitly enquired, whether of all the ſorts we have enumerated, the old or the younger trees do yield the faireſt colour, pleaſanteſt grain, and gloſs for wainſcot, cabinets, boxes, gun-ſtocks, &c. and what kind of Pear and Plum tree give the deepeſt red, and approaches neareſt in beauty to Braſil. It is affirmed the old Oak, old Walnut, and young Aſh, are beſt for moſt uſes, and yet for ſhip-carpentry this does not always hold; nor does the bigneſs of it ſo much recommend it, becauſe it is commonly a ſign of age, which (like to very old men) is often brittle and effete. Black and thorny Plum tree is of the deepeſt Oriency; but whether theſe belong to the foreſt, I am not yet ſatisfied, and therefore have aſſigned them no chapter apart. But now I ſpeak of the Plum tree, I am aſſured by a worthy friend, that the gum thereof diſſolved in vinegar, has cured the moſt contumacious tetters, when all other remedies, outward or inwardly applied, nothing availed.

Laſtly, I would alſo add ſomething concerning what woods are obſerved to be moſt ſonorous for muſical inſtruments: We as yet detect few but the German Aer, which is a ſpecies of Maple, for the rims of viols, and the choiceſt and fineſt grained Fir for the bellies: The finger-boards, back, and ribs, I have ſeen of Yew, Pear tree, &c. but Pipes, Recorders, and Wind-Inſtruments, are made both of hard and ſoft woods. I had lately an organ with a ſet of Oaken pipes, which were the moſt ſweet and mellow that were ever heard; it was a very old inſtrument, and formerly, I think, belonging to the Duke of Norfolk.

BOOK III.

For the place of growth, that timber is eſteemed beſt which grows moſt in the ſun, and on a dry and hale ground; for thoſe trees which ſuck, and drink little, are moſt hard, robuſt, and longeſt lived. Inſtances of ſobriety. The climate contributes much to its quality, and the northern ſituation is preferred to the reſt of the quarters; ſo as that which grew in Tuſcany was, of old, thought better than that of the Venetian ſide; and yet the Biſcay timber is eſteemed better than what they have from colder countries; and trees of the wilder kind, and barren, than the over-much cultivated and great bearers. But of this already.

To omit nothing, authors have ſummed up the natures of timber, as the hardeſt, Ebony, Box, Larch, Lotus, Terebinth, Cornus, Yew, &c. and tho' theſe indurated woods be too ponderous for ſhip-carpentry, yet there have been veſſels built of them by the Portugueze in America; in which the planks and innermoſt timbers had been ſawed very thin for lightneſs ſake, and the knee-timber put together of divers ſmall pieces, by reaſon of the inflexibleneſs of it, both which could not but render the ſhips very weak: In the mean time, the perfection of theſe hard materials conſiſts much in their receiving the moſt exquiſite politure; and for this, Linſeed, or the ſweeter Nut-oil, does the effect beſt: Pliny gives us the receipt, with a decoction of Walnut-ſhells, and certain wild Pears. Next to theſe, Oak for ſhips and houſes, (or more minutely) the Oak for the keel, the Robur for the prow, Walnut the ſtern, Elm the pump. Then for bucklers and targets were commended the more ſoft and moiſt, becauſe apt to cloſe, ſwell, and make up their wounds again; ſuch as Willow, Lime, Birch, Alder, Elder, Aſh, Poplar, &c.

The Robur, or Wild Oak timber, is beſt to ſtand in ground; the Quercus without; and our Engliſh, for being leaſt obnoxious to ſplinter, and the Iriſh for reſiſting the worm, (tough as leather) are doubtleſs, for ſhipping, to be preferred before all other. The Cypreſs, Fir, Pines, Cedar, &c. are beſt for poſts and columns, becauſe of their erect growth, natural and comely diminutions. Then again it is noted, that Oriental trees are hardeſt towards the cortex or bark, our weſtern towards the middle, which we call the Heart; and that trees which bear no fruit, or but little, are more durable than the more pregnant. It is noted of Oak, that the knot of an inveterate tree, juſt where a luſty arm joins to the ſtem, is as curiouſly veined as the Walnut, which being omitted in the chapter of the Oak, I here obſerve. The Palmeto growing to that prodigious height in the Bar-

badoes, and whoſe top bears an excellently taſted Cabbage, grows ſo wonderfully hard, that an edge-tool can ſcarce be forced into it.

Pines, Pitch, Alder, and Elm are excellent to make pumps and conduit-pipes, and for all water-works, &c. Fir for beams, bolts, bars, being tough, and not ſo apt to break as the hardeſt Oak: In ſum, the more odoriferous trees are the more durable and laſting; and yet I conceive that well-ſeaſoned Oak may contend with any of them, eſpecially if either preſerved under ground, or kept perfectly dry. In the mean time, as to its application in ſhipping, the beſt of it ought to be employed for the keel, (that is, within, elſe Elm exceeds) the main beams and rafters, whilſt for the ornamental parts, much ſlighter timber ſerves. One note more is requiſite, namely, that great care be had to make the Trundles of the beſt, tougheſt, and ſincereſt part, many a veſſel having been loſt upon this account; and therefore dry and young timber is to be preferred for this, and for which the Hollanders are plentifully furniſhed out of Ireland, as Nicholas Witſen has himſelf acknowledged.

Is it not, after all this, to be deplored, that we, who have ſuch perpetual uſe and convenience for ſhip-timber, ſhould be driven to procure of foreign ſtores, ſo many thouſand loads, at intolerable prices? But this we are obliged to do from the eaſtern countries, as far as Norway, Poland, Pruſſia, Dantzick, and farther, even from Bohemia, though greatly impaired by ſobbing ſo long in the paſſage: But of this our moſt induſtrious and worthy friend Mr. Pepys (late Secretary of the Admiralty) has given a juſt and profitable account in his Memoirs.

Here farther for the uſes of timber, I will obſerve to our reader ſome other particulars, for direction both of the ſeller and buyer, applicable to the ſeveral ſpecies: And firſt of the two ſorts of Lathes allowed by ſtatute, one of five, the other of four feet long, becauſe of the different intervals of rafters: That of five has one hundred to the bundle; that of four, one hundred and twenty, and ſhould be in breadth one inch and half, and half an inch thick: of either of which ſorts there are three, viz. Heart-oak, Sap-lathes, and Deal-lathes, which alſo differ in price: The Heart-oak are fitteſt to lie under tiling; the ſecond ſort for plaſtering of ſide-walls; and the third for ceilings, becauſe they are ſtraight and even.

Here we will gratify our curious reader with as curious an account of the comparative ſtrength and fortitude of the ſeveral uſual ſorts of timber,

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as upon ſuggeſtions, previous to this work, it was ſeveral times experimented by the Royal Society, though omitted in the firſt impreſſion, becauſe the trials were not compleat as they now thus ſtand in our regiſter.

MARCH 23, 1663.

The experiment of breaking ſeveral ſorts of wood was begun to be made: and there were taken three pieces of ſeveral kinds, of Fir, Oak, and Aſh, each an inch thick, and two feet long; the Fir weighed 8$\frac{1}{8}$ ounces, and was broken with two hundred pounds weight; the Oak weighed 12$\frac{1}{4}$ ounces, broken with two hundred and fifty pounds weight; the Aſh weighed 10$\frac{1}{4}$ ounces, broken with three hundred and twenty-five pounds weight.

Beſides, there were taken three pieces of the ſame ſort of wood, each of half an inch thick, and one foot long; the Fir weighed one ounce, and was broken with five eighths of an hundred; the Oak weighed 1$\frac{5}{8}$ ounces, broken with five eighths of an hundred; the Aſh weighed 1$\frac{3}{8}$ ounces, broken with an hundred pounds.

Again; there was a piece of Fir half an inch ſquare, and two feet long, broken with thirty-three pounds; a piece of half an inch thick, one inch broad, and ſeven feet long, broken with one hundred weight edge-wiſe; and a piece of half an inch thick, and one and a half broad, and two feet long, broken with one hundred and twenty-five pounds weight, alſo edge-wiſe.

The experiment was ordered to be repeated, and recommended by the Preſident to Sir William Petty and Dr. Hook; and it was ſuggeſted by ſome of the company, that in theſe trials conſideration might be had of the age, knottineſs, ſolidity, ſeveral ſoils, and parts of trees, &c. and Sir Robert Murray did particularly add, that it might be obſerved how far any kind of wood bends before it breaks.

MARCH —— 1664.

The operator gave an account of more pieces of wood broken by weight, viz. a piece of Fir four feet long, two inches thick, and fifty-three ounces Weight, broken with eight hundred pounds weight, and very little bending with ſeven hundred and fifty; by which the hypotheſis ſeems to be confirmed, that in ſimilar pieces the proportion of the breaking-weight is according to the baſis of the wood broken. Secondly, of a piece of Fir two

feet long, one inch ſquare, cut away from the middle both ways to half an inch, which ſupported two hundred and fifty pounds weight before it broke, which is more by fifty pounds than a piece of the ſame thickneſs every way was formerly broken with; the difference was gueſſed to proceed from the more firmneſs of this other piece.

His Lordſhip, the Preſident, was deſired to contribute to the proſecution of this experiment, and particularly to conſider what line a beam muſt be cut in, and how thick it ought to be at the extreme, to be equally ſtrong, which was brought in April 13, but I find it not entered.

APRIL 20, 1664.

The experiment of breaking wood was proſecuted, and there were taken two pieces of Fir, each two feet long, and one inch ſquare, which were broken, the one long-ways with three hundred pounds weight, the other tranſverſe-ways with two hundred and fifty pounds: Secondly, two pieces of the ſame wood, of each three-quarters of an inch ſquare, and two feet long, broken, the one long-ways with one hundred and twenty-five; the other tranſverſe with one hundred pounds weight: Thirdly, one piece of two feet long and half an inch ſquare, broken long-ways with eighty-one pounds: Fourthly, one piece cut out of a crooked Oaken billet, with an arching grain, about three quarters of an inch ſquare, and two feet long, broken with ſeventy-five pounds.

JUNE 29, 1664.

There were made ſeveral experiments more of breaking wood: Firſt, a piece of Fir, half an inch diameter, and three inches long, at which diſtance the weight hung, broke in the plane of the grain horizontally, with ſixty-ſix pounds and three-quarters, whereof fifteen pounds troy; vertically, with two pounds more. Alſo Fir of one quarter of an inch diameter, and an inch and a half long, broke vertically with twenty pounds, and horizontally with nineteen pounds. Elm of half inch diameter, and three inches long, broke horizontally with forty-ſeven pounds; vertically with twenty-three pounds. Elm a quarter of an inch diameter, and an inch and a half long, broke horizontally with twelve pounds; vertically with twelve pounds, which is note-worthy.

JULY 6, 1664.

The experiment of breaking woods proſecuted: A piece of Oak of half an inch diameter, and three inches long, at which diſtance the weight

Book III. hung, broke horizontally with forty-eight pounds; vertically with forty pounds. Aſh of half an inch diameter, and three inches long, horizontally with ſeventy-ſeven pounds; vertically with ſeventy-five pounds. Aſh of half an inch diameter, and an inch and a half long, horizontally with nineteen pounds; vertically with ten pounds.——Thus far the Regiſter.

In the mean time I learn, that in the mines of Mendip, pieces of timber, of but the thickneſs of a man's arm, will ſupport ten tun of earth; and that ſome of it has lain two hundred years, which is yet as firm as ever, growing tough and black; and being expoſed two or three days to the wind and ſun, ſcarce yields to the ax.

Here might come in the Problems of Cardinal Cuſanus, in lib. iv. Idiotæ dial. 4to, concerning the different velocity of the aſcent of great pieces of timber, before the ſmaller, ſubmerged in water, as alſo of the weight; as *v. g.* Why a piece of wood an hundred pounds weight, poiſing more in the air than two pounds of lead, the two pounds of lead ſhould ſeem to weigh (he ſhould ſay ſink) more in the water *? Why fruits, being cut off from the tree, weigh heavier than when they were growing? With ſeveral the like paradoxes, haply more curious than uſeful, and therefore we purpoſely omit them; but ſo may we not the recommendation of that uſeful Treatiſe of Duplicate Proportion, together with a new Hypotheſis of Elaſtic or Springy Bodies, to ſhew the ſtrengths of timbers, and other homogeneous materials applied to buildings, machines, &c. as it is publiſhed by that admirable Genius, the learned Sir William Petty: To which we join that part of Dr. Grew's Comparative Anatomy of Trunks, as variouſly fitted for mechanical uſes; where that moſt induſtrious and curious ſearcher into Nature, deſcribes to us whence woods are ſoft, faſt, hard, apt to be cleft, tough, durable, &c.

* Of the Specifick Gravity of timber in proportion to water, ſee the table in the Philoſophical Tranſactions, n. 169, and 199.

Laſtly, Concerning ſquared and principal timber, for any uſual buildings, theſe are the legal proportions, and which builders ought not to vary from.

Summers or girders from	F. 14 to 18	F. 16 to 20	In length, muſt be in their ſquare,	In. 11 to 13	In. 8 & 9	Joyſts of	Feet 11½ in length muſt be in their 10½ ſquare	In. 8——3 and 7——3 and 6——3
	20 to 23	23 to 26		14 to 16	10 to 12			
	26 to 28			17	14			

Binding Joysts and Trimmers from { F. 7 to F. 11½ } In length must be in their square { 6 & 7 & 8 — 5 } Wall-plates and beams of any length, from 15 feet, may have in their square { In. 7 — 5 ; 10 & 6 ; 8 — 6 }

Purlynes from { F. 15 to F. 18½ ; 18 to 21½ } In length, must have in their square { 9 — 8 & 12 — 9 }

Principal rafters cut taper from { F. 12½ to F. 14½ ; 14½ to 18½ ; 18½ to 21½ ; 21½ to 24½ ; 24½ to 26½ } In length, must have in their square on one side { In. 8 to 5 ; 9 to 7 ; 10 to 8 ; 12 to 9 ; 9 to 9 } On the other side { 6 ; 7 ; 8 ; 8 ; 9 } Single rafters in length from 6½ to 9½ — { F. 6½ ; 0 ; 9½ } must have in their squ. { 5-3½ & 5-4 }

Principal dischargers of any length from { Feet 10 upward } must have in their square { Inch. 13 —— 12 ; 16 —— 13 }

But Carpenters also work by square, which is ten feet in framing and erecting the carcase, as they call it, of any timber edifice, which is valued according to the goodness and choice of the materials, and curiosity in framing, especially roofs and stair-cases, which are of most charges. And here might also something be added concerning the manner of framing the carcases of buildings, as of floors, pitch of roofs, the length of hips and sleepers, together with the names of all those several timbers used in fabricks totally consisting of wood; but I find it done to my hand, and published some years since, at the end of a late Translation of the first Book of Palladio, to which I refer the reader. And to accomplish our artist in timber, with the utmost which that material is capable of, I do recommend him to the study and contemplation of that stupendous roof, which now lies over the renowned Sheldonean Theatre at the University of Oxford; being the sole work and contrivement of my most Honoured Friend, Sir Christopher Wren, now worthily dignified with the superintendency of the Royal Buildings. See Dr. Plot's description of it in his Natural History of Oxfordshire, 272, 273, tab. 13, 14; also Dr. Wallis de Motu, part iii. de Vecte, cap. vi. prop. 10.

Other conversions there are of timber, of all lengths, sizes, and dimensions, for arches, bridges, floors, and flat-work, (without the supports of

Book III. pillars) tables, cabinets, inlayings, and carvings, ſkrews &c. with the art of Turning, to the height of which divers Gentlemen have arrived, and, for their diverſion, produced pieces of admirable invention and curioſity: Theſe, I ſay, belonging to the mechanick uſes of timber, might enter here, with a catalogue of innumerable models and other rarities (to be found in the repoſitories and collections of the curious): But let this ſuffice.

We did, in book ii. chap. i. mention certain ſubterranean trees, which Mr. Cambden ſuppoſes grew altogether under the ground: And truly it did appear a very paradox to me, till I both ſaw, and diligently examined that piece (plank, ſtone, or both ſhall I name it?) of Lignum Foſſile taken out of a certain quarry thereof at Aqua Sparta, not far from Rome, and ſent to the moſt incomparably learned Sir George Ent, by that obliging Virtuoſo Cavalier dal Pozzo. He that ſhall examine the hardneſs, and feel the ponderouſneſs of it, ſinking in water, &c. will eaſily take it for a ſtone; but he that ſhall behold its grain, ſo exquiſitely undulated and varied, together with its colour, manner of hewing, chips, and other moſt perfect reſemblances, will never ſcruple to pronounce it arrant wood.

Signor Stelluti, an Italian, has publiſhed a whole Treatiſe expreſsly to deſcribe this great curioſity: And there has been brought to our notice a certain relation of an Elm growing in Berkſhire, near Farringdon, which being cut towards the root, was there plainly petrified; the like, as I once myſelf remember to have ſeen in another tree, which grew quite through a rock near the ſepulchre of Agrippina (the mother of that monſter Nero) at the Baia by Naples, which appeared to be all ſtone, and trickling down in drops of water, if I forget not. But whilſt others have philoſophized, according to their manner, upon theſe extraordinary concretions, ſee what the moſt induſtrious and knowing Dr. Hook, Curator of this Royal Society, has with no leſs reaſon, but more ſuccinctneſs, obſerved from a late microſcopical examen of another piece of petrified wood; the deſcription and ingenuity whereof cannot but gratify the curious, who will, by this inſtance, not only be inſtructed how to make enquiries upon the like occaſions, but ſee alſo with what accurateneſs the Society conſtantly proceed in all their indagations and experiments; and with what candour they relate, and communicate them.

It reſembled wood, in that

" Firſt, All the parts of the petrified ſubſtance ſeemed not at all diſlocated " or altered from their natural poſition whiles they were wood; but the " whole piece retained the exact ſhape of wood, having many of the con- " ſpicuous pores of wood ſtill remaining, and ſhewing a manifeſt difference, " viſible enough between the grain of the wood and that of the bark; " eſpecially, when any ſide of it was cut ſmooth and polite; for then it " appeared to have a very lovely grain, like that of ſome curious cloſe " wood.

" Next, it reſembled wood in that all the ſmaller and (if ſo I may call " thoſe which are only to be ſeen by a good glaſs) microſcopical pores of " it appeared (either when the ſubſtance was cut and poliſhed tranſverſly, " or parallel to the pores) perfectly like the microſcopical pores of ſeveral " kinds of wood, retaining both the ſhape and poſition of ſuch pores.

" It differed from wood,

" Firſt, in weight; being to common water, as $3\frac{1}{4}$ to 1; whereas there " are few of our Engliſh woods that, when dry, are found to be ſo heavy " as water.

" Secondly, in hardneſs; being very near as hard as flint, and in ſome " places of it alſo reſembling the grain of a flint; it would very readily " cut glaſs, and could not, without difficulty, (eſpecially in ſome parts of " it) be ſcratched by a black hard flint; it would readily ſtrike fire againſt " a ſteel, as alſo againſt a flint.

" Thirdly, in the cloſeneſs of it; for, though all the microſcopical " pores of the wood were very conſpicuous in one poſition; yet, by alter- " ing that poſition of the poliſhed ſurface to the light, it alſo was manifeſt " that thoſe pores appeared darker than the reſt of the body, only becauſe " they were filled up with a more duſky ſubſtance, and not becauſe they " were hollow.

" Fourthly, in that it would not burn in the fire; nay, though I kept " it a good while red-hot in the flame of a lamp, very intenſely caſt on it " by a blaſt thro' a ſmall pipe, yet it ſeemed not at all to have diminiſhed " its extenſion; but only I found it to have changed its colour, and to " have put on a more dark and duſky brown hue: Nor could I perceive

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" that thoſe parts which ſeemed to have been wood at firſt, were any thing " waſted, but the parts appeared as ſolid and cloſe as before. It was far- " ther obſervable, that as it did not conſume like wood, ſo neither did it " crack and fly like a flint, or ſuch like hard ſtone; nor was it long be- " fore it appeared red hot.

" Fifthly, in its diſſolubleneſs; for putting ſome drops of diſtilled vine- " gar upon the ſtone, I found it preſently to yield very many bubbles, juſt " like thoſe which may be obſerved in ſpirit of vinegar when it corrodes " coral; though I gueſs many of thoſe bubbles proceeded from the ſmall " parcels of air which were driven out of the pores of this petrified ſub- " ſtance, by the inſinuating liquid menſtruum.

" Sixthly, in its rigidneſs and friability; being not at all flexible, but " brittle like a flint; inſomuch, that with one knock of a hammer I broke " off a ſmall piece of it, and with the ſame hammer quickly beat it to " pretty fine powder upon an anvil.

" Seventhly, it ſeemed alſo very differing from wood to the touch, feel- " ing more cold than wood uſually does, and much like other cloſe ſtones " and minerals.

" The reaſon of all which phænomena ſeems to be,

" That this petrified wood having lain in ſome place where it was well " ſoaked with petrifying water (that is, ſuch a water as is well impregna- " ted with ſtony and earthy particles) did by degrees ſeparate, by ſtraining " and filtration, or, perhaps, by precipitation, coheſion, or coagulation, " abundance of ſtony particles from that permeating water; which ſtony " particles having, by means of the fluid vehicle, conveyed themſelves " not only into the microſcopical pores, and perfectly ſtopped them up, but " alſo into the pores, which may perhaps be even in that part of the wood " which thro' the microſcope appears moſt ſolid, did thereby ſo augment " the weight of the wood, as to make it above three times heavier than " water, and perhaps ſix times as heavy as it was when wood: Next, they " hereby ſo lock up and fetter the parts of the wood, that the fire cannot " eaſily make them fly away, but the action of the fire upon them is only " able to char thoſe parts as it were; like as a piece of wood, if it be " cloſed very faſt up in clay, and kept a good while red hot in the fire, " will, by the heat of the fire, be chared, and not conſumed; which may

" perhaps be the reaſon why the petrified ſubſtance appeared of a blackiſh
" brown colour after it had been burnt. By this intruſion of the petrified
" particles, it alſo becomes hard and friable; for the ſmaller pores of the
" wood being perfectly ſtuffed up with theſe ſtony particles, the particles
" of the wood have few or no pores in which they can reſide; and, conſe-
" quently, no flection or yielding can be cauſed in ſuch a ſubſtance. The
" remaining particles likewiſe of the wood among the ſtony particles, may
" keep them from cracking and flying, as they do in a flint."

The caſual finding of ſubterraneous trees has been the occaſion of this curious digreſſion, beſides what we have already ſaid in chap. i. book ii. Now it were a ſtrange paradox to affirm, that the timber under the ground ſhould, to a great degree, equal the value of that which grows above the ground; ſeeing, though it be far leſs, yet it is far richer, the roots of the vileſt ſhrub being better for its toughneſs, and, for ornament and delicate uſes, much more preferable than the heart of the faireſt and ſoundeſt tree: And many hills and other waſte places, that have in late and former ages been ſtately groves and woods, have yet this treaſure remaining, and perchance found and unperiſhed, and commonly (as we obſerved) an hindrance to other plantations; engines therefore, and expedients for the more eaſily extracting theſe cumbrances, and making riddance upon ſuch occaſions, beſides thoſe we have produced, ſhould be excogitated and enquired after, for the diſpatch of this difficult work.

From all theſe inſtances we may gather the neceſſity of a more than ordinary ſtudy and diligence in thoſe whoſe profeſſion obliges them to deal in timber; nor is it a ſmall ſtock of philoſophy that will enable them to ſkill in the nature and properties of this material, which not only concerns the Architects themſelves, but their Subſidiaries, viz. Carpenters, Joiners, and eſpecially Wood-Brokers. I cannot therefore but take notice, that among the antient Sportulæ *, bequeathed by ſeveral Founders and Foun-

NOTES.

* Pliny, in lib. xix. cap. ii. deſcribes a plant called *Spartum*, of which, when macerated, ropes were made, and which in its natural ſtate was applied to various domeſtic purpoſes. Of this Livy too ſays, that Aſdrubal had laid up a conſiderable quantity for the ſervice of his fleet. See lib. xxii. cap. xx. It is probably from this plant that the terms *Sporta*, *Sportula*, *&c.* are derived, for it appears to have been very proper for the purpoſe of making baſkets. Sportula is literally a little baſket, and, in

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dreſſes for the encouragement of Gardeners, there was a College or Hall, not unlike that of our Carpenters, where, upon a certain day, the fraternity not only met to feaſt, but, doubtleſs, to confer and edify one another, as appears by an antient inſcription of the Dendrophori at Puteoli, mentioned by the learned Dr. Spon *, which, for the honour of our preſent Diſcourſe, we ſubjoin:

* Miſcell. Erudit. Antiq. Sect. II. Art. xi.

EX S.C. DENDROPHORI CREATI QVI SVNT
SVB CVRA XV VIR ST. CCVV
PATRON. L. AMPIVS STEPHANVS SAC.
M. DEI QQ. DEND. DEDICATIONI HVIVS
PANEM VINVM ET SPORTVLAS DEDIT
C. VALERIVS PICENTINVS — LONGINIVS IVSTINVS
C. IVLIVS HERCVLANVS — A. FIRMIVS POLYBIVS

With many others, (a numerous catalogue of Conſuls names) it being, it ſeems, a corporation eſtabliſhed by the ſtate, when they carried boughs and branches of trees in proceſſion, and diſtributed a Sportula of bread and wine: But of this, and of the Fabri Tignarii, Naupegiarii, (Ship-Carpenters) and Centonarii, ſee this learned man's excellent diſſertation.

The Jews had their feaſt of Ξυλοφορια, mentioned by Joſephus, in which they were obliged to carry wood to the temple for the maintaining the fires of the altar.

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the Roman claſſics, ſignifies a diſtribution, ſometimes of victuals, becauſe they were given in ſuch baſkets, and ſometimes of money. The diſtinction of *Patroni* and *Clientes* formed an eſſential part of the Roman political conſtitution; and whenever the latter had been employed in doing honour to their Patrons, it had been cuſtomary from early times to entertain them at ſupper, which among the Romans was the principal meal. This cuſtom, it ſeems, continued to the reign of Nero; for Suetonius, lib. vi. cap. xvi. tells us, that Nero changed the public ſuppers into Sportulæ, which from Juvenal. ſat. i. v. 95, appear to have been a diſtribution of victuals in the porch or front of the Patron's houſe. Afterwards, inſtead of victuals, a ſmall ſum of money, forty quadrantes, which were a coin of braſs or lead, in value ſomething leſs than a halfpenny each, was given, ſtill under the name of Sportula, as appears from Martial, lib. iii. epig. vii.—Domitian at firſt ſeems to have purſued the practice of Nero; for it appears from Suetonius, lib. viii. cap. iv. that on a certain ſolemn occaſion he gave victuals to the Senate and the Knights in Panaria, and to the common people in Sportellæ. The Panaria probably were veſſels of a larger ſize, or more elegant materials than the Sportellæ. Afterwards, however, Domitian reſtored the antient cuſtom of treating the Clients with a full meal, as we are informed by Suetonius, lib. viii. cap. vii. as well as by Martial, lib. viii. epig. l. v. 10. In this paſſage Martial oppoſes the Spor-

These colleges or halls were dedicated to Diana, as Goddeſs of the Woods, of which another Roman inſcription is yet extant: CHAP. IV.

DIANAE.
COLLEG. NAUPEGIAR.
M. JUNIUS. BALISTUS.
ET. Q. AVILLIUS. EROS.
II. VIR. D. D.

For the uſe of our chimneys, and maintenance of fire, the plenty of wood for fuel, rather than the quality, is to be looked after; and yet there are ſome greatly to be preferred before others, as harder, longer laſting, better heating, and more chearfully burning; for which we have commended the Aſh, &c. in the foregoing paragraphs, and to which I pretend not here to add much for the avoiding repetitions, though even an hiſtory of the beſt way of charring would not miſbecome this diſcourſe. FUEL.

But ſomething more is to be ſaid, ſure, concerning the felling of *Lignum*, fuel-wood; for ſo critics would diſtinguiſh it from *Materia*, timber. Benedictus Curſius, Hortor. lib. viii. cap. xi. reckons up what woods

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tula to what he calls *recta cœna*, which it ſeems is what he meant, in the preceding quotation where he makes a like diſtinction, by the term *ſalarium*, that is, victuals for a day. It appears that among the Romans largeſſes of victuals or of money were very common upon ſolemn occaſions, ſuch as marriages, entering on public offices, or the like.—Claudius, we are told, jocularly gave the name of Sportula to a ſmall exhibition of Gladiators, without preparation, and that continued but for a ſhort time, becauſe, ſays Suetonius, *primum daturus edixerat velut ad ſubitam conditamq; cœnulam invitare ſe populum:* he ſaid he would give them ſuch an entertainment as if the people had invited themſelves to a ſhort and haſty ſupper, lib. v. chap. xxi.—The younger Pliny, in Book x. ep. cxvii. writes from Bithynia to Trajan to aſk the Emperor's opinion concerning the cuſtom that prevailed there of diſtributing a Denarius or two, a coin in value about ſevenpence, on occaſion of taking the manly robe, of entering on a magiſtracy, or dedicating a public work, which largeſſes the critics on this author have not heſitated to call Sportulæ, probably with ſufficient reaſon, though that word does not occur in the epiſtle, notwithſtanding that it has been referred to by ſome authors as juſtifying the application of this term in the very extenſive ſenſe of any kind of gift on any public occaſion.—In the Greek Gloſſes, Sportula is rendered ſometimes a diſtribution in general, ſometimes a diſtribution of a little piece of gold, ſometimes a diſtribution of ſilver.

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* V. Euſtath. in Odyſſ. iii.

make the beſt firing: Alſo of coaling, *et de facibus*, clearing, and what elſe belongs to ξυλοτομία, eſpecially for the uſe of ſacrifices *, which had their particular ſorts, as in the temple Deſpoene in Arcadia, where they were prohibited the burning of Olive-wood, the Vaticinatric Laurel, Φυλὸν Μαντικόν, the Thick-rind Oak, or any fungous, or rotten wood, but were obliged to uſe what was well dried, and apt to kindle without ſmoaking. In the ſacrifice of Jupiter they uſed White Poplar, and the Pine on the Altar of Ceres. The Perſian Magi burnt their ſacrifices with Myrtle and the boughs of Laurel, and, in general, all the ſacrifices offered up to the Pagan Gods were lighted with that wood which was ſacred to the particular Deity. Of all which to particularize, let the curious inquire. We proceed therefore with what concerns this moſt uſeful chapter.

And firſt, that our Fueliſt begin with the under-wood: Some conceive between Martinmas and Holy-Rood; but generally with Oak as ſoon as it will ſtrip, but not after May; and for Aſhes, betwixt Michaelmas and Candlemas. Let theſe be ſo felled as that the cattle may have the browſing of them, for in winter they will not only eat the tender twigs, but even the very moſs; but fell no more in a day than they can eat for this purpoſe. This done, kid or bavin them, and pitch them upon their ends, to preſerve them from rotting: Thus the under-wood being diſpoſed of, the reſt will proſper the better; and beſides, it otherwiſe does but rot upon the earth, and deſtroy that which would ſpring. If you head or top for the fire, it is not amiſs to begin three or four feet above the timber, if it be conſiderable: but in caſe they are only ſhaken trees and hedge-rows, ſtrip them even to thirty feet high, becauſe they are uſually full of boughs; and it were good to top ſuch as you perceive to wither at the tops a competent way beneath, to prevent their ſickneſs downwards, which will elſe certainly enſue; whereas by this means even dying trees may be preſerved many years to good emolument, though they never advance taller; and being thus frequently ſhred, they will produce more than if ſuffered to ſtand and decay: This is a profitable note for ſuch as have old, doating, or anyways infirm wood. In other fellings, ſome adviſe never to commence the diſbranching from the top; for though the incumbency of the very boughs upon the next cauſe them to fall off the eaſier, yet it endangers the ſplicing of the next, which is very prejudicial, and therefore advife the beginning at the neareſt. And in cutting for fuel, you may as at the top, ſo at the ſides, cut a foot or more from the body; but never when you ſhred timber-trees. We have ſaid how dangerous it is to

cut for fire-wood when the ſap is up; it is a mark of improvident huſbands; beſides, it will never burn well, though abundance be congeſted. Laſtly, remember that the eaſt and north winds are unkind to the ſucceeding ſhoots.

Thus we have endeavoured to preſcribe the beſt directions we could learn concerning this neceſſary ſubject. And in this penury of that dear commodity, and to incite all ingenious perſons, ſtudious of the benefit of their country, to think of ways how our woods may be preſerved, by all manner of arts which may prolong the laſting of our fuel, I would give the beſt encouragements. Thoſe that ſhall ſeriouſly conſider the intolerable miſery of the poor Cauchi (the then inhabitants of the Low-Countries) deſcribed by Pliny, lib. xvi. cap. i. (how opulent ſoever their late induſtry has rendered them) for want only of wood for fuel, will have reaſon to deplore the exceſſive decay of our former ſtore of that uſeful commodity; and by what ſhifts our neighbours, the Hollanders, do yet repair that defect, be invited to exerciſe their ingenuity: The proceſs of which is caſting the die, or ſquare of the turf, in four equal quarters; and to build them ſo up, (as our brick-makers do their crude ware) that they may have the free intercourſe of the air till they are dry. See Quicciardius, in his Deſcription of Holland, or Du Cange's Gloſſary, verbo Turba. But beſides the dung of beaſts *, and the peat and turf (which we may find in our ouzy lands and heathy commons) for their chimnies, they make uſe of ſtoves, both portable and ſtanding; and truly the more frequent uſe of thoſe inventions in our great waſting cities, (as the cuſtom is through all Germany) as alſo of thoſe new and excellent ovens invented by Dr. Keffler, for the incomparably baking of bread, &c. would be an extraordinary expedient of huſbanding our fuel, as well as the right mingling, and making up of charcoal-duſt and loam, as it is hinted to us by Sir Hugh Platt, and is generally uſed in Maeſtricht, Liege, and the country about it, than which there is not a more ſweet, laſting, and beautiful fuel. The manner of it is thus:

* In many places (where fuel is ſcarce) poor people ſpread Fern and Straw in the ways and paths where cattle dung and tread, and then clap it againſt a wall till it be dry; but that of hogs is very noiſome.

Take about one third part of the ſmalleſt of any coal, (pit, ſea, or charcoal) and commixing it very well with loam, (whereof there is in ſome places to be found a ſort ſomewhat more combuſtible) make it up into balls (moiſtened with a little urine of man or beaſt) as big as an ordinary gooſe-egg, or ſomewhat bigger; or, if you will, in any other form, like brick-bats, &c. Expoſe theſe in the air till they are thoroughly dry; they

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will be built into the moſt orderly fires you can imagine, burn very clear, give a wonderful heat, and continue a very long time. But firſt you muſt make the fire of charcoal, or ſmall-coal, covering it with your eggs, hot-ſhots, or hovilles, as they are called, and building them up in pyramids, or what ſhape you pleaſe, they will continue a glowing, ſolemn, and conſtant fire for ſeven or eight hours, without being ſtirred; then encourage and recruit the innermoſt with a few freſh eggs, and turn the reſt, which are not yet quite reduced to cinders. This mixture is deviſed to ſlacken the impetuous devouring of the fire, and to keep the coals from conſuming too faſt.

Two or three ſhort billets, covered with charcoal, laſt much longer, and with more life, than twice the quantity by itſelf, whether charcoal alone or billet; and the billets under the charcoal being undiſturbed, will melt as it were into charcoals of ſuch a laſting ſize.

If ſmall-coals be ſpread over the charcoal, where you burn it alone, it will bind it to longer continuance; and yet more, if the ſmall-coal be made of the roots of Thorns, Briars, and Brambles. Conſult Lord Bacon, Exp. *775*.

The *Quercus Marina* (wrack or ſea-weed) which comes in our oyſter-barrels, laid under Newcaſtle coal to kindle it (as the uſe is in ſome places) will, as I am informed, make it out-laſt two great fires of ſimple coals, and maintain a glowing luculent heat without waſte. This ſort of fuel is much made uſe of in Malta and the Iſlands thereabout, eſpecially to burn in their ovens; and the Peaſant who firſt brought it into cuſtom, I find highly commended by an Author, as a great Benefactor to his country. The manner of gathering it, is to cut it in ſummer-time from the rocks, whereon it grows abundantly, and bringing it in boats or otherwiſe to land, ſpread and dry it in the ſun like hay, turning and cocking it till it be fully cured. It makes an excellent fire alone, and roaſts to admiration; and when all is burnt, the aſhes make one of the beſt manures for land in the world for the time they continue in virtue. This fuel adds much life, continuance, and aid to our ſullen ſea-coal; and if the main ocean ſhould afford fuel, (as the Barnacles and Soland-geeſe are ſaid to do in ſome parts of Scotland with the very ſticks of their nests) we in theſe Iſles may thank ourſelves if we be not warm. Theſe few particulars I but mention to animate improvements, and encourage ingenious attempts to detect more

cheap and uſeful proceſſes for ways of charring coals, peat, and the like fuliginous materials, as the accompliſhed Mr. Boyle has intimated to us in the fifth of thoſe his precious Eſſays concerning the uſefulneſs of Natural Philoſophy, part ii. chap. vii. to which I refer the curious. In the mean time, were not He worthy a ſtatue of gold, that (ſalvo to our Newcaſtle trade and ſeminary of mariners) ſhould in this penury of fire-wood about ſo monſtrous a devourer as this vaſt city, (poiſoned with ſmoak and ſoot) find out an expedient that ſhould, within the ſpace of five and twenty years, free it from all this helliſh and pernicious fog, by furniſhing it with fuel ſufficient to feed and maintain all its hearths and fires with ſweet and wholeſome billet? This the ingenious Mr. Nourſe ſeems to demonſtrate, and I think not impoſſible, whilſt my *Fumifugium* * is long ſince vaniſhed in *Aura*. There is no very great ſtore of wood about Madrid, where the winters are ſharp, and ſo very piercing, that there is ſpent no leſs than four millions of arrobas of charcoal, (every arroba being three quarters of our buſhel, and pays to the King a Real before it comes into the town, or is ſold): It is charred of the Enzina, or Cork tree: beſides which they uſe very little fuel-wood, it being exceeding hard, and conſequently laſting and ſweet.——But to return to the law.

By the preamble of the ſtatute of 7 Edward VI. one may perceive (the meaſures compared) how plentiful fuel was in the time of Edward IV. to what it was in the reigns of his ſucceſſors: This ſuggeſted a review of ſizes, and a reformation of abuſes; in which it was enacted, that every ſack of coals ſhould contain four buſhels; every Taleſhide to be four feet long, beſides the carf; and if named of one, marked one, to contain ſixteen inches circumference, within a foot of the middle; if of two marks, twenty-three inches; of three, twenty-eight; of four, thirty-five; of five, thirty-eight inches about, and ſo proportionably.

Billets were to be of three feet and four inches in length: The ſingle to be ſeventeen inches and an half about; and every billet of one caſt (as they term the mark) to be ten inches about; of two caſt, fourteen inches, and to be marked (unleſs for the private uſe of the owner) within ſix inches of the middle; of one caſt, within four inches of the end, &c.

NOTES.

* Mr. Evelyn wrote a Treatiſe in 1661, entitled *Fumifugium*, recommending a method to prevent the ill effects of ſmoak in the city of London.

Every bound faggot ſhould be three feet long; the band twenty-four inches circumference, beſides the knot.

In the 43d Eliz. the ſame ſtatute (which before only concerned London and its ſuburbs) was made more univerſal, and that of Edw. VI. explained with this addition: For ſuch Taleſhides as were of neceſſity to be made of cleft-wood, if of one mark, and half round, to be nineteen inches about; if quarter-cleft, eighteeen inches and an half: Marked two, being round, it ſhall be twenty-three inches compaſs; half-round, twenty-ſeven; quarter-cleft, twenty-ſix: Marked three, round, twenty-eight; half-round, thirty-three; quarter-cleft, thirty-two: Marked four, being round, thirty-three inches about; half-round, thirty-nine; quarter-cleft, thirty-eight: Marked five, round, thirty-eight inches about; half-round, forty-four; quarter-cleft, forty-three. The meaſure to be taken within half a foot of the middle of the length mentioned in the former ſtatute.

Then for the billet, every one named a ſingle, being round, to have ſeven inches and an half circumference; but no ſingle to be made of cleft-wood: If marked one, and round, to contain eleven inches compaſs; if half-round, thirteen; quarter-cleft, twelve and an half.

If marked two, being round, to contain ſixteen inches; half-round, nineteen; quarter-cleft, eighteen and an half; the length as in the ſtatute of Kind Edward VI.

Faggots to be every ſtick of three feet in length, excepting only one ſtick of one foot long, to harden and wedge the binding of it; this to prevent the abuſe, too much practiſed, of filling the middle part and ends with traſh and ſhort ſticks, which had been omitted in the former ſtatute: Concerning this and the dimenſions of wood in the ſtack, ſee coppices, chap. i. book iii. to direct the leſs-inſtructed purchaſer: And I have been the more particular upon this occaſion, becauſe nothing is more deceitful than our fuel brought in billet by the notch, as they call it in London; for by the vile iniquity of ſome wretches marking the billets as they come to the wharf, Gentlemen are egregiouſly cheated. I could produce an inſtance of a friend of mine, and a Member of this Society, of which the wood-monger has little cauſe to brag, ſince he never durſt come at him, or challenge his money for the commodity he brought, becauſe he durſt not ſtand to the meaſure.

At Hall, near Foy, there is a faggot which conſiſts but of one piece of wood, naturally grown in that form, with a band wrapped about it, and parted at the ends into four ſticks, one of which is ſubdivided into two others: It was carefully preſerved many years by an Earl of Devonſhire, and looked on as portending the fate of his eſtate, which is ſince indeed come into the hands of four Corniſh Gentlemen, one of whoſe eſtates is likewiſe divided betwixt two heirs. This we have out of Cambden; and I here note for the extravagancy of the thing, tho', as to the verity of ſuch portents from trees, &c. I do not find upon enquiry (which I have diligently made of my Lord Brereton) that there is any certainty of the riſing of thoſe logs in the lake belonging to that noble perſon, ſo as ſtill to premoniſh the death of the heir of that family, how confidently ſoever reported; though ſometimes it has happened, but the event is not conſtant. To this claſs may be referred what is affirmed concerning the fatal prediction of Oaks bearing ſtrange leaves, which may be enquired of; and of accidents faſciating the boughs and branches of trees, as noticed by Dr. Plott in Willows and other ſoft woods, eſpecially in an Aſh at Biſſeter uniformly wreathed two or three times round: Such a curioſity alſo hangs up in the Portic of the Phyſic-Garden at Oxford, in a top branch of Holly, which ſhews it likewiſe happening ſometimes even to harder woods; and it is probable that ſuch as we ſometimes find ſo *helically* twiſted, have received ſome blaſt that has contracted the fibres, and curled them in that extravagant manner. Wonderful contorſion and perplexity of the parts of trees may be ſeen and admired in Tea roots, eſpecially in that given to the Royal Society by the Right Hon. the Lord Somer, (the late moſt learned preſident) and now amongſt the natural rarities of the repoſitory.

But I will now deſcribe to you the myſtery of Charring, (whereof ſomething was but touched in the proceſs of extracting tar out of the Pines) as I received it from a moſt induſtrious perſon, and ſo conclude the chapter.

Of charcoal there is uſually made three ſorts, viz. one for the Iron-works, a ſecond for Gunpowder, and a third for London and Court, beſides ſmall-coals, of which we ſhall alſo ſpeak in due place.

We will begin with that ſort which is uſed for the Iron-works, becauſe the reſt are made much after the ſame manner, and with very little difference.

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The beſt wood for this is good Oak, cut into lengths of three feet, as they ſize it for the ſtack: This is better than the cord-wood, though of a large meaſure, and much uſed in Eſſex.

The wood being cut, and ſet in ſtacks ready for the coaling, chooſe out ſome level place in the coppice, the moſt free from ſtubs, &c. to make the hearth on: In the midſt of this area drive down a ſtake for your centre, and with a pole, having a ring faſtened to one of the extreams, (or elſe with a cord put over the centre) deſcribe a circumference from twenty or more feet ſemidiameter, according to the quantity of your wood deſigned for coaling, which being near, may conveniently be charred on that hearth; and which at one time may be twelve, ſixteen, twenty, twenty-four, even to thirty ſtacks: If twelve therefore be the quantity you will coal, a circle, whoſe diameter is twenty-four feet, will ſuffice for the hearth; if twenty ſtacks, a diameter of thirty-two feet; if thirty, forty feet; and ſo proportionably.

Having thus marked out the ground with mattocks, hoes, and fit inſtruments, bare it of the turf, and of all other combuſtible ſtuff whatſoever, which you are to rake up towards the periphery, or outſide of the circumference, for an uſe to be afterwards made of it, planeing and levelling the ground within the circle: This done, the wood is to be brought from the neareſt part where it is ſtacked, in wheel-barrows; and firſt the ſmalleſt of it placed at the utmoſt limit, or very margin of the hearth, where it is to be ſet long-ways, as it lay in the ſtack; the biggeſt of the wood pitch, or ſet up on end round about againſt the ſmall wood, and all this within the circle, till you come within five or ſix feet of the centre; at which diſtance you ſhall begin to ſet the wood in a triangular form till it come to be three feet high: Againſt this again, place your greater wood almoſt perpendicular, reducing it from the triangular to a circular form, till, being come within a yard of the centre, you may pile the wood long-ways, as it lay in the ſtack, being careful that the ends of the wood do not touch the pole, which muſt now be erected in the centre, nine feet in height, that ſo there may remain a round hole, which is to be formed in working up the ſtack-wood for a tunnel, and the more commodious firing of the pit, as they call it, though not very properly. This provided for, go on to pile, and ſet your wood upright to the other as before, till, having gained a yard more, you lay it long-ways again, as was ſhewed: And thus continue the work, ſtill interchanging the po-

ſition of the wood till the whole area of the hearth and circle be filled and piled up at the leaſt eight feet high, and ſo drawn in by degrees in piling, that it reſemble the form of a copped houſhold loaf, filling all inequalities with the ſmaller truncheons till it lie very cloſe, and be perfectly and evenly ſhaped. This done, take ſtraw, haume, or fern, and lay it on the outſide of the bottom of the heap, or wood, to keep the next cover from falling amongſt the ſticks; upon this put the turf, and caſt on the duſt and rubbiſh which was grubbed and raked up at the making of the hearth, and reſerved near the circle of it; with this cover the whole heap of wood to the very top of the pit or tunnel to a reaſonable and competent thickneſs, beaten cloſe and even, that ſo the fire may not vent but in the places where you intend it; and if, in preparing the hearth, at firſt there did not riſe ſufficient turf and rubbiſh for this work, ſupply it from ſome convenient place near to your heap. There be who cover this again with a ſandy or finer mould, which, if it cloſe well, need not be above an inch or two thick. This done, provide a ſcreen by making light hurdles with ſlit rods and ſtraw of a competent thickneſs to keep off the wind, and broad and high enough to defend an oppoſite ſide to the very top of your pit, being eight or nine feet, and ſo as to be eaſily removed, as need ſhall require, for the *luing* of your pit.

When now all is in this poſture, and the wood well ranged and cloſed, as has been directed, ſet fire to your heap; but firſt you muſt provide you a ladder to aſcend the top of your pit; this they uſually make of a curved tiller, fit to apply to the convex ſhape of the heap, and cut it full of notches for the more commodious ſetting their feet whiles they govern the fire above; therefore now they pull up and take away the ſtake which was erected in the centre to guide the building of the pile and cavity of the tunnel: This done, put in a quantity of charcoals, (about a peck) and let them fall to the bottom of the hearth; upon them caſt in coals that are fully kindled; and when thoſe which were firſt put in are beginning to ſink, throw in more fuel, and ſo, from time to time, till the coals have univerſally taken fire up to the top; then cut an ample and reaſonable thick turf, and clap it over the hole, or mouth of the tunnel, ſtopping it as cloſe as may be with ſome of the former duſt and rubbiſh. Laſtly, with the handles of your rakes, or the like, you muſt make vent-holes, or regiſters, (as our chemiſts name them) through the ſtuff which covers your heap to the very wood, theſe in ran-

Book III.

gers of two or three feet diſtance, quite round within a foot (or thereabout) of the top, though ſome begin them at the bottom: A day after, begin another row of holes a foot and a half beneath the former, and ſo more, till they arrive to the ground, as occaſion requires. Note, That, as the pit does coal and ſink towards the centre, it is continually to be fed with ſhort and fitting wood, that no part remain unfired; and if it chars faſter at one part than at another, there cloſe up the vent-holes, and open them where need is. A pit will in this manner be burning off and charring five or ſix days; and as it coals, the ſmoke, from thick and groſs clouds, will grow more blue and livid, and the whole maſs ſink accordingly, ſo as by theſe indications you may the better know how to ſtop and govern your ſpiracles. Two or three days it will only require for cooling, which, the vents being ſtopped, they aſſiſt by taking now off the outward covering with a rabil or rubber; but this not far above the ſpace of one yard breadth at a time; and firſt they remove the coarſeſt and groſſeſt of it, throwing the finer over the heap again, that ſo it may neither cool too haſtily, nor endanger the burning and reducing all to aſhes, ſhould the whole pit be uncovered and expoſed to the air at once; therefore they open it thus round by degrees.

When now, by all the former ſymptoms, you judge it fully charred, you may begin to draw, that is, to take out the coals, firſt round the bottom, by which means the coals, rubbiſh, and duſt ſinking and falling in together, may choak and extinguiſh the fire.

Your coals ſufficiently cooled, with a very long-toothed rake and a Vann you may load them into the coal-wains, which are made cloſe with boards purpoſely to carry them to market. Of theſe coals the groſſer ſort are commonly reſerved for the forges and iron-works, the middling and ſmoother put up in ſacks, and carried by the colliers to London and the adjacent towns: Thoſe which are charred of the roots, if picked out, are accounted beſt for chemical fires, and where a laſting and extraordinary blaſt is required.

Coal for the powder mills is made of Alder wood (but Lime tree were much better, had we it in that plenty which we eaſily might) cut, ſtacked, and ſet on the hearth like the former; but firſt the wood ought to be wholly diſbarked, which work is to be done about Midſummer before, and being thoroughly dry, it may be coaled in the ſame method, the heap

or pile only ſomewhat ſmaller, by reaſon that they ſeldom coal above five or ſix ſtacks at a time, laying it but two lengths of the wood one above the other, in form ſomewhat flatter on the top than what we have deſcribed; likewiſe do they fling all their rubbiſh and duſt on the top, and begin not to cover at the bottom, as in the former example. In like ſort, when they have drawn up the fire in the tunnel, and ſtopped it, they begin to draw down their duſt by degrees round the heap, and this proportionably as it fires, till they come about to the bottom; all which is diſpatched in the ſpace of two days. One of theſe heaps will char three-ſcore ſacks of coal, which may all be carried at one time in a waggon; and ſome make the court-coals after the ſame manner.

Laſtly, Small coals are made of the ſpray and bruſh-wood, which is ſtripped off from the branches of copſe-wood, and which is ſometimes bound up into bavins for this uſe, though alſo it be as frequently charred without binding, and then they call it *cooming* it together. This they place in ſome near floor, made level and freed of incumbrances, where, ſetting one of the bavins or part of the ſpray on fire, two men ſtand ready to throw on bavin upon bavin, as faſt as they can take fire, which makes a very great and ſudden blaze, till they have burnt all that lies near the place, to the number (it may be) of five or ſix hundred bavins: But before they begin to ſet fire, they fill great tubs or veſſels with water, which ſtand ready by them, and this they daſh on with a great diſh or ſcoup ſo ſoon as ever they have thrown on all their bavins, continually plying the great heap of glowing coals, which gives a ſudden ſtop to the fury of the fire, whiles with a great rake they lay and ſpread it abroad, and ply their caſting of water ſtill on the coals, which are now perpetually turned by two men with great ſhovels, a third throwing on the water. This they continue till no more fire appears, though they ceaſe not from being very hot; after this they ſhovel them up into great heaps, and, when they are thoroughly cold, put them up in ſacks for London, where they uſe them amongſt divers artificers, both to kindle greater fires, and to temper and anneal their ſeveral works. Laſtly, this is to be obſerved, that the wood which yields the fineſt coal is more flexible and gentle than that which yields the contrary.

The beſt ſeaſon for the fetching home of other fuel is in June, the ways being then moſt dry and paſſable; yet I know ſome good huſbands will begin rather in May, becauſe fallowing and ſtirring of ground for

Book III. corn comes in the enſuing months, and the days are long enough, and ſwains have then leaſt to do.

And thus we have ſeen how for Houſe-boot, and Ship-boot, Plow-boot, Hey-boot, and Fire-boot, the Planting and Propagation of Timber and Foreſt-trees is requiſite; ſo as it was not for nothing that the very name (which the Greeks generally applied to timber) ὕλη, by ſynechdoche, was taken always *pro materia*; ſince we hardly find any thing in nature more univerſally uſeful; or, in compariſon with it, deſerving the name of Material; it being, in truth, the mother-parent and (metaphorically) the paſſive principle ready for the form.

To complete this chapter of the univerſal uſe of trees, and the parts of them, ſomething I could be tempted to ſay concerning ſtaves, wands, &c. their antiquity, uſe, divine, domeſtick, civil, and political; the time of cutting, manner of ſeaſoning, forming, and other curious particulars, (how dry ſoever the ſubject may appear) both of delight and profit; but we reſerve it for ſome more fit opportunity, and perhaps it may merit a peculiar treatiſe, as acceptable as it will prove amuſing.

We have already ſpoken of that modern art of *Tapping* trees in the ſpring, by which, doubtleſs, ſome excellent and ſpecifick medicines may be attained, as (before) from the Birch, for the ſtone; from Elms and Elder, againſt fevers; ſo from the Vine, the Oak, and even the very Bramble, beſides the wholeſome and pleaſant drinks, ſpirits, &c. that may poſſibly be educed out of them——This we leave to the induſtrious, ſatisfying ourſelves that we have been among the firſt who have hinted and publiſhed the ways of performing it.

Let us now ſum up all the good qualities, and tranſcendent perfections of trees, in the harmonious Poets Conſort of Elogies:

——— ——— dant utile lignum
Navigiis Pinos, domibus Cedroſque Cupreſſoſque;
Hinc radios trivere rotis, hinc tympana plaustris
Agricolæ, & pandas ratibus poſuere carinas.
Viminibus Salices fœcundæ, frondibus Ulmi:
At Myrtus validis haſtilibus, & bona bello
Cornus: Ityræos Taxi torquentur in arcus.

Nec Tiliæ læves, aut torno raſile Buxum,
Non formam accipiunt ferroque cavantur acuto:
Nec non & torrentem undam levis innatat Alnus
Miſſa Pado; nec non & apes examina condunt
Corticibuſque cavis, vitioſæque Ilicis alveo. GEORG. ii.

—— Pines are for maſts an uſeful wood,
Cedar and Cypreſs, to build houſes good:
Hence covers for their carts, and ſpokes for wheels
Swains make, and ſhips do form their crooked keels:
With twigs the Sallows, Elms with leaves are freight;
Myrtles ſtout ſpears, and Cornel good for fight:
The Yews into Ityrean bows are bent;
Smooth Limes and Box, the Turner's inſtrument
Shaves into form, and hollow cups does trim;
And down the rapid Po light Alders ſwim:
In hollow bark bees do their honey ſtive,
And make the trunk of an old Oak their hive.

The moſt ingenious Ovid introduces the miraculous groves raiſed by the melodious ſong of Orpheus:

——————— Non Chaonis abfuit arbos,
Non nemus Heliadum, non frondibus Æſculus altis,
Nec Tiliæ molles, nec Fagus, & innuba Laurus,
Et Coryli fragiles, & fraxinus utilis haſtis,
Enodiſque Abies, curvataque glandibus Ilex,
Et Platanus genialis, Acerque coloribus impar,
Amnicolæque ſimul Salices, & aquatica Lotos,
Perpetuoque virens Buxus, tenueſque Myricæ,
Et bicolor Myrtus, & baccis cærula Tinus:
Vos quoque flexi-pedes Hederæ veniſtis, & una
Pampineæ vites, & amictæ Vitibus Ulmi:
Orníque, & Piceæ, Pomoque onerata rubenti
Arbutus, & lentæ victoris præmia Palmæ:
Et ſuccincta comas, hirſutaque vertice Pinus
Grata Deum matri, &c. MET. x.

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——— nor trees of Chaony,
The Poplar, various Oaks that pierce the ſky,
Soft Linden, ſmooth-rind Beech, unmarried Bays,
The brittle Haſel, Aſh, whoſe ſpears we praiſe,
Unknotty Fir, the ſolace-ſhading Planes,
Rough Cheſnuts, Maple fleck'd with different grains,
Stream-bordering Willow, Lotus loving lakes,
Tough Box, whom never ſappy ſpring forſakes,
The ſlender Tamariſk, with trees that bear
A purple Fig, nor Myrtles abſent were.
The wanton Ivy wreath'd in amorous twines,
Vines bearing Grapes, and Elms ſupporting Vines,
Straight Service trees, trees dropping pitch, fruit-red
Arbutus, theſe the reſt accompanied.
With limber Palms, of victory the prize,
And upright Pine, whoſe leaves like briſtles riſe,
Priz'd by the Mother of the Gods ——— SANDYS.

This incomparable Poet is imitated by our divine Spencer, where he brings his gentle Knight into a ſhady grove, praiſing

——— the trees ſo ſtraight and high,
The ſailing Pine, the Cedar proud and tall,
The Vine-prop Elm, the Poplar never dry,
The builder Oak, ſole King of Foreſts all,
The Aſpine, good for ſtaves; the Cypreſs funeral.
The Laurel, meed of mighty conquerors
And Poets ſage: The Fir that weepeth ſtill,
The Willow, worne of forlorne paramours,
The Eugh, obedient to the bender's will,
The Birch for ſhafts, the Sallow for the mill,
The Myrrh, ſweet bleeding in the bitter wound,
The war-like Beech, the Aſh for nothing ill,
The fruitful Olive, and the Platane round,
The carver Holm, the Maple ſeldom inward ſound. CANTO I.

And in this ſymphony might the noble Taſſo bear likewiſe his part, but that theſe are ſufficient, & *tria ſunt omnia*.

CHAP. IV.

What now remains, concerns only ſome general precepts, and directions applicable to moſt of that we have formerly touched; together with a brief of what farther laws have been enacted for the improvement and preſervation of woods; and which having diſpatched, we ſhall with a ſhort Paræneſis, touching the preſent ordering and diſpoſing of the Royal Plantations for the future benefit of the Nation, put an end to this ruſtick Diſcourſe.

CHAP. V.

APHORISMS, *or certain General Precepts, of Uſe to the foregoing Chapters.*

Book III. TRY all ſorts of ſeeds, and by their thriving you ſhall beſt diſcern what are the moſt proper kinds for grounds,

Quippe ſolo natura ſubeſt——

and of theſe deſign the main of your plantation. Try all ſoils, and fit the ſpecies to their natures. Beech, Haſel, and Holly affect gravel and gritty; and if mixed with loam, Oak, Aſh, and Elm. In ſtiff ground, the Aſh and Hornbeam; and in light feeding ground or loam, any ſort whatſoever: In the lower and wetter lands, the Aquatics. *

Keep your newly-ſown ſeeds continually freſh, and in the ſhade (as much as may be) till they peep.

NOTES.

* Of plants, each ſpecies affects a particular ſoil in preference to every other. In their culture, therefore, it is of the utmoſt importance to have a diſtinct knowledge of the *Loca Natalia*, that the nature of the ſoil in which they are cultivated may be made to approach, as near as poſſible, to that in which they ſpontaneouſly grow. This is the ſolid and proper foundation of Planting and Gardening:

Nec vero terræ férre omnes omnia poſſunt.
Fluminibus Salices, craſſiſquè paludibus Alni
Naſcuntur, ſteriles ſaxoſis montibus Orni,
Litora Myrteis lætiſſima: denique apertos
Bacchus amat colles, Aquilonem et frigora Taxi. GEORG. ii.

The numerous ſpecies of plants which grow betwixt the North Pole and the Equator, when viewed in detail, appear to differ from each other only by inſenſible degrees; yet are the plants of the frozen zones, when viewed in cumulo, or in a body, totally different from thoſe which are produced betwixt the tropics. Thus we often ſee whole families of plants natives of the torrid zone, which are never to be found in any of the others.——In the climate of plants, ſays Linnæus, are to be conſidered latitude, longitude, and the temperature or elevation of the ſoil. Vaillant was among the firſt who viewed the Loca Natalia of plants in this light; but his obſervations were confined to latitude alone.——Places ſituated under the ſame parallel of latitude, but in oppoſite hemiſpheres, produce plants that are totally different; even thoſe in the ſame hemiſphere are rarely alike. Thus Rome, Pekin, and New-York in America, are ſituated almoſt in the ſame degree of north latitude, yet produce very different plants. The

All curious ſeeds and plants are diligently to be weeded, till they are ſtrong enough to over-drop or ſuppreſs them; and you ſhall carefully hoe, half-dig, and ſtir up the earth about their roots during the firſt three years, eſpecially in the vernal and autumnal equinoxes: This work ſhould be done in a moiſt ſeaſon for the firſt year, to prevent the duſt, and the ſuffocating of the tender buds; but afterwards in the dry weather.

Plants raiſed from ſeed ſhould be thinned where they come up too thick; and none ſo fit as thoſe you thus draw to be tranſplanted into hedge-rows, eſpecially where ground is precious.

Suckers that ſprout from the fartheſt part of the ſtem, or body of the mother-tree, are beſt, as eaſier plucked up without detriment to the roots and fibres, or violence to the mother: It were good therefore firſt to uncover the roots whence they ſpring, and to cut them cloſe off, replanting them immediately: thoſe which grow at more diſtance may be ſeparated with ſome of the old root, if you find the ſucker not well furniſhed.

NOTES.

ſame may be ſaid of the plants of Florida and Paleſtine, the Cape of Good-Hope, and Chili in South-America, places which exactly correſpond in latitude; the two former ſituated in the northern hemiſphere; the latter in the ſouthern.——What has been affirmed of latitude, may likewiſe be aſſerted of places that are ſituated upon the ſame meridian. Thus the North-Cape, Rome, Upſal, and the Cape of Good-Hope, agree in longitude, yet produce plants that are totally different.——The aptitude or diſpoſition of plants to grow in certain climates, and not in others, ſeems to depend not ſo much upon longitude and latitude, as upon the elevation of the ſoil, or difference of temperature in ſuch climates. From this cauſe proceeds the difference which is generally found to obtain betwixt the plants of the torrid, and thoſe of the temperate and frigid zones. For when in the torrid zone we find the mountains, which, by their elevation, have acquired a temperature ſimilar to that of the temperate or frigid zones, we always diſcover on ſuch mountains the ſame, or, at leaſt, a part of the ſame plants. Thus the plants on the mountains of Lapland, of Switzerland, Greenland, Siberia, Wales, the Pyreneans, Olympus, Ararat, and Braſil, though placed at ſuch immenſe diſtances from each other, are nearly the ſame.——As at a certain depth, the temperature of water is found to be nearly the ſame in all climates, ſo the greateſt part of Aquatic plants are common to the torrid, temperate, and frigid zones. Thus the Water-lily, *Aidrovanda*, Sun-dew, Arrow-head, Water-milfoil, and many other Aquatics, are equally natives of Europe and the Indies.

BOOK III. To produce ſuckers, lay the roots bare, and ſlit ſome of them here and there diſcreetly, and then cover them.

Layers are to be bent down and couched in rich mould; and if you find them ſtubborn, you may ſlit a little in the bark and wood, but no deeper than to make it ply, without wounding the tender heart. Putting forth root is aſſiſted by pricking the bark, ſlitting or binding a pack-thread about the part you would have them ſpring from.

The proper ſeaſon is from the early ſpring or Mid-Auguſt, and in all dry ſeaſons obſerve to keep them diligently watered.

Slips and cuttings (by which moſt trees may be propagated) taken in moiſt ground, from Auguſt to the end of April frequently moiſtened, ſhould be ſeparated at the burs, joints, or knobs, two or three inches beneath them: Strip them of their leaves before you bury them, leaving no ſide-branches, or little top. Some ſlit the end where it is cut off: at two years end is the ſooneſt they will be fit to take up; layers much ſooner.

In tranſplanting, omit not the placing of your trees towards their accuſtomed aſpect; and if you have leiſure, make the holes the autumn before; the wider the better: Three feet over and two deep is little enough if the ground be any thing ſtiff, often ſtirring and turning the mould, and mixing it with better as you may find cauſe. This done, dig or plough about them, and that as near their ſtems as you can come without hurting them, and therefore rather uſe the ſpade for the firſt two or three years; and preſerve what you plant ſteady from the winds and annoyance of cattle, &c.

Remove the ſofteſt wood to the moiſteſt grounds:

Diviſæ arboribus patriæ——— GEORG. ii.

Begin to tranſplant Foreſt-trees when the leaves fall after Michaelmas; you may adventure when they are tarniſhed and grow yellow; it is loſt time to commence later, and, for the moſt part of your trees, early Tranſplanters ſeldom repent; for ſometimes a tedious bind of froſt prevents the whole ſeaſon, and the baldneſs of the tree is a note of deceit; for ſome Oaks, Hornbeam, and moſt Beeches preſerve their dead leaves till new ones puſh them off.

Set deeper in the lighter grounds than in the ſtrong, but ſhalloweſt in clay: Five inches is ſufficient for the drieſt, and one or two for the moiſt, provided you eſtabliſh them againſt winds.

Plant forth in warm and moiſt ſeaſons, the air tranquil and ſerene, the wind weſterly; but never whiles it actually freezes, rains, or in miſty weather, for it moulds and infects the roots.

What you gather and draw out of woods, plant immediately, for their roots are very apt to be mortified, or hardened and withered by the winds and cold air.

Trees produced from ſeeds muſt have the tap-roots abated, (the Walnut tree and ſome others excepted, and yet if planted merely for fruit, ſome affirm it may be adventured on with ſucceſs) and the bruiſed parts cut away, but ſparing the fibrous, for they are the principal feeders; and thoſe who cleanſe them too much are puniſhed for the miſtake.

In ſpring, rub off ſome of the collateral buds to check the exuberancy of ſap in the branches, till the roots be well eſtabliſhed.

Tranſplant no more than you well fence, for that neglected, tree-culture comes to nothing; therefore all young-ſet trees ſhould be defended from the winds and ſun, eſpecially the eaſt and north, till their roots are fixed, that is, till you perceive them ſhoot; and the not exactly obſerving of this article, is the cauſe of the periſhing of the moſt tender plantations; for it is the invaſion of theſe two aſſailants which does more miſchief to our new-ſet and leſs hardy trees, than the moſt ſevere and durable froſts of a whole winter. And here let me add this caution again, that, in planting of trees of ſtature for avenues or ſhades, you ſet them at ſuch diſtance as that they be not in reach of the manſion-houſe, in caſe of being blown down by the winds, for reaſons ſufficiently obvious. See Hiſt. of the Storm, Nov. 26, 1703.

The propereſt ſoil, and moſt natural, apply to diſtinct ſpecies: *Nec vero terræ ferre omnes omnia poſſunt.* Yet we find by experience that moſt of our foreſt-trees grow well enough in the coarſeſt lands, provided there be a competent depth of mould; for albeit moſt of our wild plants covet to

Book III. run juſt under the ſurface, yet, where there is not ſufficient depth to cool them, and entertain the moiſture and influences, they are neither laſting nor proſperous.

Wood well planted will grow in mooriſh, boggy, heathy, and the ſtonieſt grounds; only the white and blue clay, which is commonly the beſt paſture, is the worſt for wood; and ſuch good timber as we find in any of theſe, Oaks excepted, is of an exceſſive age, requiring thrice the time to arrive at their ſtature.

If the ſeaſon require it, all new plantations are to be plied with waterings, which is better poured into a circle at ſome diſtance from the roots, which ſhould continually be bared of graſs; and if the water be rich, or impregnated, the ſhoots will ſoon diſcover it; for the liquor, being percolated through a quantity of earth, will carry the nitrous virtue of the ſoil with it: By no means therefore water at the ſtem, becauſe it waſhes the mould from the roots, comes too crude, and endangers their rotting.

But, for the cooling and refreſhing tree roots, the congeſting of rotten litter, ſprinkled over with fine earth, is good; or place potſheards, flints, or pebbles near the foot of the ſtem; for ſo the Poet:

> Aut lapidem bibulum, aut ſquallentes infode conchas:
> Inter enim labentur aquæ, tenuiſque ſubibit
> Halitus.———— GEORG. ii.

> Lime-ſtones, or ſqualid ſhells, that may the rain,
> Vapours, and gliding moiſture entertain.

But remember you remove them after a competent time, elſe the vermin, ſnails, and inſects, which they produce and ſhelter, will gnaw and greatly injure the bark; and therefore, to lay a coat of moiſt rotten litter with a little earth upon it, will preſerve it moiſt in ſummer and warm in winter, enriching the ſhowers and dews that ſtrain through it.

Young plants will be ſtrangled with corn, oats, peaſe, or hemp, or any rankly growing grain, if a competent circle and diſtance be not left, as of near a yard or ſo of the ſtem. This is a uſeful remark; but whether the ſetting or ſowing of beans near trees make them thrive the more,

(as Theophraſtus writes, I ſuppoſe he means fruit-trees) I leave to expe- CHAP. V.
rience.

Cut no trees (eſpecially having an eminent pith in them, being young and tender too) when either heat or cold are in extreams, nor in very wet and ſnowy weather; and in this work it is profitable to diſcharge all trees of unthriving, broken, wind-ſhaken browſe, and ſuch as our law terms *Cablicia*, and to take them off to the quick,

——Ne pars ſincera trahatur.

And for Evergreens, eſpecially ſuch as are tender, prune them not after planting till they do radicate, that is, by ſome little freſh ſhoot diſcover that they have taken root.

Cut not off the top of the leading twig or ſhoot (unleſs very crooked, and then at the next erect bud) when you tranſplant timber-trees, but thoſe of the collateral you may ſhorten, ſtripping up the reſt cloſe to the ſtem; and ſuch as you do ſpare, let them not be the moſt oppoſite, but rather one above another, to preſerve the part from ſwelling and hindering its taper growth: Be careful alſo to keep your trees from being top-heavy, by ſhortening the ſide-branches competently near the ſtem. Young plants, nipt either by the froſt or teeth of cattle, do commonly break on the ſides, which impedes both growth and ſpiring: In this caſe, prune off ſome, and quicken the leading ſhoot with your knife at ſome diſtance beneath its infirmity; but if it be in a very unlikely condition at ſpring, cut off all cloſe to the very ground and hope for a new ſhoot, continually ſuppreſſing whatever elſe may accompany it, by cutting them away in ſummer.

Walnut, Aſh, and pithy trees are ſafer pruned in ſummer and warm weather than in the ſpring, whatever the vulgar fancy.

I will conclude with the technical names, or diſſimilar parts of trees, as I find them enumerated by the induſtrious and learned Dr. Merett: Scapus, Truncus, Cortex, Liber, Malicorium, Matrix, Medulla & Cor, Pecten, Circuli, Surculi, Rami, Sarmenta, Ramuſculi, Spadix, Vimen, Virgultum & Cremium, Vitilia, Talea, Scobs, Termes, Turiones, Frondes, Cachrys & Nucamentum, Julus & Catulus, Comæ: The ſpecies; Frutex, Suffrutex, &c. to which add Alburnum, Capitulum, Cima,

Echinus, Geniculum, Pericarpium, Petiolus, &c. All which I leave to be put into good and proper Engliſh (as our learned Phytologiſt Mr. Ray has done) by thoſe who ſhall once oblige our nation with a full and abſolutely compleat dictionary, as yet a deſiderate amongſt us; however of late infinitely improved. *

To this I ſhall add the time and ſeaſon of the flouriſhing of trees, computing from the entry of each month as the figures denote; that is, from March (where the Doctor begins) incluſively. March, Acer 3. (i.) from March to May, viz. one month; *& ſic de cæteris)* Populus 2. Quercus 5. Sorbus 2. Ulmus 2. April, Alnus 2. Betula 2. Caſtanea 4. Euonymus 2. Fagus 2. Fraxinus 2. Nux Juglans 3. Salix 2. Sambucus 2. May, Cornus 2. Geniſta 4. Juniperus, Morus 2. Tilia 4. June, Aquifolium 2. July, Arbutus 2. February, Buxus 2, &c.

Many more uſeful obſervations may be collected and added to theſe, from the diligent experience of planters. †

NOTES.

* In the year 1764, Dr. Berkenhout publiſhed his Clavis Anglica Linguæ Botanicæ; and in 1770, Mr. C. Milne favoured the Botanical Student with a Botanical Dictionary, but upon a more enlarged plan than the former.

† The celebrated Linnæus has given us a complete catalogue of the trees in Sweden, with reſpect to the times of their *budding*, *leafing*, and *flowering:* and the ingenious Mr. Stillingfleet, in his Tracts, has favoured us with obſervations of the ſame nature upon trees and ſhrubs growing in England.

CHAP. VI.

Of the Laws and Statutes for the Preſervation and Improvement of WOODS *and* FORESTS.

IT is not to be paſſed by, that the very firſt law we find which was ever promulged, was concerning Trees—and that laws themſelves were firſt written upon them *, or tables compoſed of them; and after that eſtabliſhment in Paradiſe, the next we meet withal are as ancient as Moſes. You may find the ſtatute at large in Deut. xx. 19, 20. which tho' they chiefly tended to fruit-trees, even in an enemy's country, yet you will find a caſe of neceſſity only alledged for the permiſſion to deſtroy any other.

* The laws of Numa were firſt cut in Quernis Tabulis, before they were engraven in braſs. See Dionyſius Halicarnaſſ. l. iii.

To ſum up briefly the laws and civil conſtitutions of great antiquity, Cervius informs us it was no leſs than capital, *alienas arbores incidere*; the *Lex Aquilia*, and thoſe of the twelve tables mentioned by Paulus, Cujas, Julianus, and others of that robe, repeated divers more.

It was by thoſe ſacred conſtitutions provided, that none might ſo much as plant trees on the confines of his neighbour's ground, but he was to leave a ſpace of at the leaſt five feet, for the ſmalleſt tree, that they might not injure him with their ſhadow. *Si arbor in vicini agrum impenderit, eam ſublucato, &c.* and if, for all this, any hung over farther, it was to be ſtripped up fifteen feet: And this law Balduinus, Olderdorpius, and Hotoman recite out of Ulpian, lib. i. F. de Arb. Cædend. where we have the Prætor's interdict expreſſed, and the impendent wood adjudged to appertain to him whoſe field or fence was thereby damnified: Nay, the wiſe Solon preſcribed ordinances for the very diſtances of trees, as the divine Plato did againſt ſtealing of fruit, and violating of plantations: And the Interdiction *de Glande legenda* runs thus in Ulpian, *AIT PRÆTOR, GLANDEM, QUÆ EX ILLIUS AGRO IN TUUM CADIT, QUO MINUS ILLI TERTIO QUOQUE DIE LEGERE AUFERRE LICEAT, VIM FIERI VETO.* And yet, tho' by the Prætor's permiſſion he might come every third day to gather it up without treſpaſs, his neighbour was to ſhare of the maſt which ſo fell into his ground; and this chapter is well ſupplied by Pliny, lib. xvi. cap. v. and Cujas, upon the place, interprets Glandem to ſignify not the Acorns of the Oak alone, but all ſorts of fruit whatſo-

BOOK III. ever, lib. cxxxvi. *F. de Verb. Signif.* L. *Unis* ff. *de Glande leg.* as by uſage of the Greeks, amongſt whom ἀκρόδρυα imports all kinds of trees.

There were alſo laws concerning boundaries to be found at large in other learned authors, De Re Agraria, of which we give this ſhort extract: Some admitting any ſort of trees, others of peculiar kinds for the fencing of their grounds; others with foreign trees, that the difference of the wood might ſerve as a mark: Some by agreement planted them in common upon the very borders; ſome, at their private charge, a little within the margents of their own fields, &c. Amongſt the different ſorts of trees, we find Pines and Cypreſs trees placed for bounds, alſo Aſh, Elm, or Poplar; which being near the limits, with any cultivated ground between, the intermediate ſpaces were filled with ſhrubs. In caſe the trees were in common, ſome preſerved them untouched on both ſides; others, the ſtems only, lop, tops, and branches (eſpeciaily if they belonged to a particular perſon) to cut or ſpare at their pleaſure, provided they planted others in their room. In trees *marked*, it muſt be conſidered whether they are in *common*, which ought to be marked in the *middle*, or on each *ſide*; and if one ſide of the tree have leaves, the other ſhould be cut, to ſignify their belonging to thoſe perſons, on the border of whoſe grounds they are left entire: To this for trees of eight feet aſunder. Thoſe at twenty feet diſtance were marked with X or Γ, to notify a flexure or turning thereabout. Some permit them to ſtand till they arrive to ſuch a bulk and ſtature as to over-top the reſt, diſtinguiſhed alſo from thoſe marked on both ſides, whether they ſtand in woods, barren or uncultivated land, as being ſuppoſed in common: The ſame rule holds if marked in the middle. If but one ſide be marked, the unmarked ſide is the boundary: If the mark be different on either ſide, (and none elſe to be ſeen) ſuch trees are not to be accounted boundaries. If, as ſometimes, briars and ſuch ſhrubs grow on the antient limits, it muſt be conſidered of what kind they are, and ſhould be enquired how it happens that they are often found in the middle of the fields. Laſtly, in champaign and open places, foreign trees were uſually planted. There are more of thoſe nice rules to be found among the lawyers, whilſt before any of theſe inſtances the images of *Satyrs* bounded the confines, and were counted as *Termini* *, which none might remove, without

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* The *Hermæ*, or what the Latins call *Termini*, were placed for boundaries of lands. They were ſometimes worſhipped as gods, but the ſacrifices offered to them

being accounted as ſacrilegious, and the perſon puniſhed with death. CHAP. VI.
Theſe, and the *Hermæ*, were reputed protectors of ſuch boundaries:

——————et te pater
Silvane, tutor finium! HOR.

In the mean time, no trees whatſoever might be planted near public aqueducts, leſt the roots ſhould inſinuate into, and diſplace the ſtones; nor on the very margent of navigable rivers, leſt the boats and other veſſels, paſſing to and fro, ſhould be hindered; therefore ſuch impediments were called *retæ*, *quia naves retinent*, ſays the Gloſs; and becauſe the falling of the leaves corrupted the water: So nor within ſuch a diſtance of highways, (which alſo our own laws prohibit) that they might dry the better, and leſs cumber the traveller. Trees that obſtructed the foundation of houſes were to be felled: Barthol. lib. i. doct. c. de Interdict. Ulp. in L. priore ff. de Arb. cædend. Trees ſpreading their roots in neighbourground to be in common: See Cujas and Paulus in L. Arb. ff. de Communi dividend. where more of the *Alienation* of trees felled, and not ſtanding but with the *Funds*, as alſo of the *Uſu-fruit* of trees, and the difference betwixt Arbores Grandes, and Cremiales or Ceduæ; of all which

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were *unbloody*; and Plutarch gives the reaſon, "leſt they ſhould violate the tokens of peace and agreement by ſtaining them with blood." The Termini were originally ſquare ſtatues of Mercury, and generally without legs or arms. The Athenians placed them in the veſtibules of their houſes and temples, and it was eſteemed highly criminal to remove or deface them.——One night (ſays Thucydides) the heads of all the Hermæ in the city were cut off: Strict ſearch was made after the perpetrators of this crime, in order to bring them to puniſhment: Alcibiades was ſuſpected, —— and obliged to fly into baniſhment. Other heads, beſides that of Mercury, were placed upon ſquare pillars, and conſtituted Termini. When it was a head of Minerva, called in Greek *Athena*, it was named a *Hermathena*. Thoſe which had Apollo's head, were named *Hermapollo*; and thoſe *Hermeros* which had the head of Cupid, from his being named Eros. Such as had the heads of Hercules, Anubis, Oſyris, or Harpocrates, were called *Hermheracles*, *Hermanubis*, *Hermoſiris*, and *Hermharpocrates*. Theſe names frequently occur in the Latin claſſics. Excluſive of worſhip, it was ſtrict policy both in the Greeks and Romans to conſider their Termini as ſacred; and if we look into the books of the Old Teſtament we ſhall find that vengeance was denounced againſt ſuch as removed them. "Curſed is he that removeth his neighbour's land-mark."

Ulpian, Baldus, Alciat, with the laws to govern the Conlucatores and Sublucatores, and Pruners: Vid. Pan. ſ. c. Sent. lib. v. Feſtus, &c. for we paſs over what concerns Vines and Olive trees, to be found in Cato de R. R. &c. Nor is it here that we deſign to enlarge, as thoſe who have philologized on this occaſion, *de Sycophantis* and other curious criticiſms; but to paſs now on, and confine myſelf to the prudent ſanctions of our own Parliaments; for though, according to the old and beſt ſpirit of true Engliſh, we ought to be more powerfully led by royal example, than to have need of more cogent and violent laws; yet, that our Diſcourſe may be as ample, and as little defective as we can render it, ſomething, it is fit, ſhould be ſpoken concerning ſuch laws and ordinances as have been from time to time conſtituted amongſt us for the encouragement and direction of ſuch as do *well*, and for the animadverſion and puniſhment of thoſe who continue *refractory*.

But, before we deſcend to our municiple, and preſent laws and conſtitutions, let us enquire what was antiently meant by a Foreſt, waving thoſe (I think) impertinent etymologies, *quia foris eſt*, Lumbard Gloſs, &c. A Foreſt is properly an harbour for wild beaſts, *quaſi ferarum ſtatio*, for which mighty tracts and portions of land have been afforded (as the term is) by the Kings and Monarchs of this nation, beyond any other in Europe, and guarded with ſuch ſtrict, rigorous, and ſevere laws, as did not extend to the prohibition of killing and deſtruction of deer and veniſon alone, but even to that of killing little ſilly birds; and that not only to the forfeiture and loſs of goods, but of limb and life. Such, among others, was that of Richard I. upon incurring the loſs of the offender's eyes, teſticles, &c. to the unſufferable hinderance of great improvements, whilſt there might have been not only enough for royal diverſion, but for the increaſe of timber and people, which are the true glory and ſafety of this nation. In the mean time, it is remarkable that William Rufus, (ſucceſſor to the great Conqueror) chaſing a ſtag under a ſpreading Oak, was, by the glance of an arrow levelled at the beaſt, deprived of his life. The Hiſtorian recounts it as God's viſiting the ſin of the father upon the children, for his demoliſhing ſo many churches and villages, and turning them into receptacles and dens of wild beaſts; there having, beſides this Prince, been two more who met with their death in New-Foreſt. There were in Yorkſhire alone, in the time of Henry VIII. two hundred ſeventy and five woods, (beſides the parks and chaſes) moſt of them containing five hundred acres: See Mr. Cambden's Britannia. As to what we call

wood-land, I know not how to diſtinguiſh foreſt from woods, unleſs for its being applicable to all ſorts in common; for heretofore (which as Strabo tells us) the antient inhabitants of this iſland's ſecurity was their woods, inſtead of cities and towns, as ſtill they are among the people of the uncultivated America: Nor doubtleſs was our ſuperb and ſtately Metropolis (the antient Trinovant) any other; from whence ſome derive its name, turning Den only into Don; whilſt, ſince our remembrance, the whole city was (till the late dreadful conflagration) a *wooden city*, almoſt entirely built of wood and timber.

Wood-land in Warwickſhire (ſays the ſame learned Antiquary) was antiently called Ardena, importing the ſame in Britiſh, and ſtill retaining the ſame in what is left of that vaſt foreſt the Ardenner-Wald in the Nether Germany, which ſtretching through the Caledonium of Luxemburg to the confines of Champagne, for more than an hundred miles in length, was no more than ſuch as might compaſs a wood-land; from whence our own Danica Silva (the foreſt of Dean) might probably derive its name contracted, and Diana Nemorenſis be found under the Britiſh Arduena and Arden: But diſmiſſing theſe conjectures, we now come to the ſubject of this chapter, as it more immediately concerns our common law, and ſome of other nations, which we ſhall deduce in this order.

From the time of Edward IV. were enacted many excellent laws for the planting, ſecuring, cutting, and ordering of woods, coppices, and underwoods, as then they took cognizance of them, together with the ſeveral penalties upon the infringers, eſpecially from the 17 of Hen. VIII. 25, &c. confirmed by the 13 and 27 of Q. Eliz. cap. xxv, xix, &c. which are diligently to be conſulted, revived, put in execution, and enlarged where any defect is apparent; as in particular the act of exempting timber of twenty-two years growth from tithe, for a longer period, to render it complete and more effectual to improvement; and that law repealed, by which Willows, Sallows, Oziers, &c. (which they term *Sub-bois)* are reputed but as weeds.

Severer puniſhments have lately been ordained againſt our wood-ſtealers, deſtroyers of young trees, &c. By an antient law of ſome nation, I read, he forfeited his hand who beheaded a tree without permiſſion of the owner; and I cannot ſay they are ſharp ones, when I compare the ſeverity of our

BOOK III. laws againſt mare-ſtealers; nor am I by inclination the leaſt cruel, but I do affirm, we might as well live without mares as without maſts and ſhips; which are our wooden, but no leſs profitable horſes.

And here we cannot but perſtringe thoſe riotous aſſemblies of idle people; who, under pretence of going a *Maying*, as they term it, do oftentimes cut down and carry away fine ſtraight trees to ſet up before ſome alehouſe, or revelling-place, where they keep their drunken Bacchanalia: For tho' this cuſtom was introduced by the Emperor Anaſtaſius to aboliſh the Gentile *Majuma* of the Romans at Oſtia, which was to transfer a great Oaken tree out of ſome foreſt into the town, and erect it before their Miſtreſſes door; yet I think it were better to be quite aboliſhed amongſt us, for many reaſons, beſides that of occaſioning ſo much waſte and ſpoil as we find is done to trees at that ſeaſon, under this wanton pretence, by breaking, mangling, and tearing down of branches, and intire arms of trees, to adorn their wooden idol. The Imperial law againſt ſuch diſorders we have in L. ob. id. ſl. ad legem Aquill. & in ff. l. xlvii. tit. vii. Arborum furtim cæſarum. See alſo Triphon. L. ig. de Bon. off. cont. tab. vel in ligna focaria. L. Ligni ff. de Lege 3, &c.

To theſe I might add the laws of our King Ina; or as the learned Lambard reckons them in his 'Αρχαιονομία de priſcis Anglorum legibus, whoſe title is, Be þuþu bapnete, Of Burning Trees. The *Sanction* runs thus:

Severe laws againſt wood-ſtealers, v. Greeneway de L. L. abrog. in Holland. ad Tit. Arbor. furt. Cæſar. lib. ii. One cruelly whipt for it. See alſo Carpzovius in Prax. Crim. Par. ii. Queſt. 83. Num. 2. and ſeveral others to that purpoſe.

"If any one ſet fire of a felled wood, he ſhall be puniſhed, and beſides pay three pounds; and for thoſe who clandeſtinely cut wood, (of which the very ſound of the ax ſhall be ſufficient conviction) for every tree he ſhall be mulcted thirty ſhillings. A tree ſo felled, under whoſe ſhadow thirty hogs can ſtand, the offender ſhall be mulcted three pounds, &c."

I have heard, that in the great expedition of 1588, it was expreſsly enjoined the Spaniſh Commanders of that ſignal Armada, that if, when landed, they ſhould not be able to ſubdue our nation, and make good their conqueſt, they ſhould yet be ſure not to leave a tree ſtanding in the Foreſt of Dean. It was like the policy of the Philiſtines, when the poor Iſraelites went down to their enemies *Smiths* to ſharpen every man his tools; for, as they ſaid, *leſt the Hebrews make them ſwords or ſpears*; ſo theſe, *leſt the Engliſh build them ſhips and men of war*. Whether this were ſo or not, certain it is, we cannot be too jealous for the preſervation of our woods; and eſpecially of thoſe eminent, and, with care, inexhauſtible magazines.

In the Duke of Luxemburg's country no farmer is permitted to fell a timber-tree without making it appear he hath planted another. And we have already mentioned that inviolable cuſtom about Frankfort, where the young farmer muſt produce a certificate of his having ſet a number of Walnut trees, before he hath leave to marry. But of theſe, and the like, V. Follar in Conſtit. Rey. de Offic. Tract. 11, 92, 93, &c. I dare not ſuggeſt the encouragement of a yet farther reſtraint, that even *Proprietors* themſelves ſhould not preſume to make havock of ſome of their own woods to feed their prodigality, and heap fuel to their vices; but it is worthy of our obſervation, that (in that inimitable Oration, the ſecond Philippic) Cicero does not ſo ſharply reproach his great Antagoniſt for any other of his extravagancies, which yet he there enumerates, as for his waſteful diſpoſure of certain wood-lands belonging to the Commonwealth, amongſt his jovial Bravos and lewd Companions; *tua iſta detrimenta ſunt* (meaning his debauches) *illa noſtra*; ſpeaking of the timber. And, doubtleſs, the ſpoil and waſting of this neceſſary material is no leſs than a publick calamity. This John Duke of Lancaſter knew well enough, when, to revenge the depredations made upon the Engliſh borders, it is ſaid, he ſet four-and-twenty thouſand axes at work at once, to deſtroy the woods in Scotland.

But to the laws: It were to be wiſhed that our tender and improvable woods ſhould not admit of cattle by any means, till they were quite grown out of reach; the ſtatutes which connive at it, in favour of cuſtom, and for the ſatisfying of a few clamorous and rude *Commoners*, are too indulgent; ſince it is very evident, that leſs than a fourteen or fifteen years incloſure, is in moſt places too ſoon; and our moſt material trees would be of infinite more worth and improvement, were the ſtandards ſuffered to grow to timber, and not ſo frequently cut, at the next felling of the wood, as the general cuſtom is. In the 22d Edw. IV. the liberty arrived but to ſeven years after a felling of a foreſt or purlieu; and but three years before, without ſpecial licenſe. This was very narrow; but let us then look on England as an over-grown country.

Wood in parks was afterwards to be four years fenced, upon felling; and yearling colts and calves might be put into incloſed woods after two: By the 13th Eliz. five years, and no other cattle till ſix, if the growth was under fourteen years; or until eight, if exceeding that age till the laſt felling. All which ſtatutes being by the act of Hen. VIII. but temporal, this parliament of Elizabeth thought fit to make perpetual.

BOOK III. Then to prevent the deſtructive razing and converting of woods to paſture: No wood of two acres, and above two furlongs from the manſion-houſe, ſhould be indulged: And the prohibitions are good againſt aſſarts made in foreſts, &c. without licenſe: The penalties are indeed great, but how ſeldom inflicted? And what is now more eaſy than compounding for ſuch a licenſe?

In ſome parts of Germany where a ſingle tree is obſerved to be extraordinary fertile, a conſtant and plentiful maſt-bearer, there are laws to prohibit their felling it without ſpecial leave: And it was well enacted amongſt us, that even the owners of woods within chaſes ſhould not cut down the timber without view of officers; this act being in affirmance of the common law, and not to be violated without Preſcription: See the caſe cited by my Lord Coke in his comment on Littleton. Tenure Burgage, lib. ii. ſect. 170. Or if not within chaſes, yet where a common perſon had liberty of chaſe, &c. and this would be of much benefit, had the Regarders performed their duty, as it is at large deſcribed in the writ of the twelve articles; and that the ſurcharge of the foreſts had been honeſtly inſpected with the due perambulations, and antient metes. Thus ſhould the Juſtices of Eyre diſpoſe of no wood without expreſs commiſſion, and in convenient places. *

Care is likewiſe by our laws to be taken that no unneceſſary embezzlement be made by pretences of repair of paling, lodges, browſe for deer, &c. wind-falls, root-falls, dead and ſear trees, all which are ſubject to the

NOTES.

* A juſtice in Eyre cannot grant licence to ſell any timber, unleſs it be *ſedente curia*, or after a writ of *Ad quod damnum*; and it hath been reſolved by all the judges, that tho' juſtices in Eyre, and the King's officers within his Foreſts, have charge of veniſon, and of vert, or green hue, for the maintenance of the King's game, and all manner of trees for covert, browſe, and pannage, yet when timber of the Foreſt is ſold, it muſt be cut and taken by power under the Great Seal, or the Exchequer Seal, by view of the foreſters, that it may not be had in places inconvenient for the game: And the juſtices in Eyre, or any of the King's officers in the Foreſt, cannot ſell or diſpoſe of any wood within the Foreſt without commiſſion; ſo that the Exchequer and the Officers of the Foreſt have *diviſum imperium*, the one for the profit of the King, the other for his pleaſure. Alſo no officers of the Foreſt can claim Wind-falls, or Dotard trees, for their perquiſites, becauſe they were once parcels of the King's inheritance, but they ought to be ſold by commiſſion *for the King's beſt benefit*. Read. on Stat. p. 304, 305.

inſpection of the Warders, Juſtices Itinerants, &c. and even treſpaſſes done *de viridi* on boughs of trees, thickets, and the like, which (as has been ſhewed) are very great impediments to their growth and proſperity, ſhould be duly looked after and puniſhed, and the great neglect of Swainmote-courts reformed, &c. See Conſuet. & Aſſiſ. Foreſ. Pannagium, or Paſtura Pecorum & de Glandibus, Fleta, &c. Manwood's Foreſt-laws: Coke pla. fol. 366. lib. viii. fol. 138.

Finally, that the exorbitance and increaſe of devouring iron-mills were looked into as to their diſtance and number near the ſeas, or navigable rivers,—and what if ſome of them were even removed into another world, the *Holy Land* of New-England——for they will elſe ruin Old-England. It were better to purchaſe all our iron out of America, than thus to exhauſt our woods at home, although (I doubt not) they might be ſo ordered as to be rather a means of preſerving them. There was a ſtatute made by Queen Elizabeth to prohibit the converting of timber-trees to coal, or other fuel, for the uſe of iron-mills, if the tree were of one foot ſquare, and growing within fourteen miles of the ſea, or the greater rivers. It is pity ſome of thoſe places in Kent, Suſſex, and Surry were excepted in the proviſo, for the reaſon expreſſed in a ſtatute made 23 Elizabeth, by which even the employing of any under-wood, as well as great trees, was prohibited within twenty-two miles of London, and many other navigable rivers, creeks, and other leſſer diſtances from ſome parts of Suſſex-Downs, Cinque-Ports, Havens, &c.

One Simon Sturtivant had a patent from King James I. 1612, pretending to ſave 300,000l. a year, by melting iron oar, and other metals, with pit-coal, ſea-coal, and bruſh-fuel; it is pity it did not ſucceed.

There are ſeveral acres of wood-land, of no mean circuit, near Rocheſter, in the County of Kent, extending as far as Bexley, and indeed for many miles about Shooter's hill, near the river of Thames, which, were his Majeſty owner of them, might in a few years be of an invaluable improvement and benefit, conſidering how apt they are to grow *foreſt*, and how opportune they lie for the uſe of the Royal Navy at Chatham.

But yet to prove what it is to manage woods diſcreetly: I read of one Mr. Chriſtopher Darell, of Nudigate, a Surry Gentleman, that had a

Book III. particular indulgence for the cutting of his woods at pleaſure, though a great iron-maſter, becauſe he ſo ordered his works that they were a means of preſerving even his woods, notwithſtanding thoſe inſatiable devourers. This may appear a paradox, but it is to be made out; and I have heard my own father (whoſe eſtate was none of the leaſt wooded in England) affirm, that a forge, and ſome other mills, to which he furniſhed much fuel, were a means of maintaining and improving his woods; I ſuppoſe by increaſing the induſtry of planting and care, as what he left ſtanding of his own planting, encloſing, and cheriſhing, (lately in the poſſeſſion of my moſt honoured brother George Evelyn, of Wotton, in the ſame county, and now in mine) did (before the late hurricane) ſufficiently evince: A moſt laudable monument of his induſtry and rare example; for without ſuch an example, and ſuch an application, I am no advocate for iron-works, but a declared Denouncer. But nature has thought fit to produce this waſting oar more plentifully in wood-land than any other ground, and to enrich our foreſts to their own deſtruction:

O ſemper bona Pauperies! & conditus altâ
Theſaurus tellure nocens! O ſemper ovantes,
Integræ, ſalvæque ſolo non divite Sylvæ! Couleii Pl. lib. vi.

O poverty! ſtill ſafe; and therefore found
Inſep'rably with miſchiefs under ground!
Woods tall and reverend, from all time appear
Inviolable, where no Mine is near.

For ſo our ſweet Poet deplores the fate of the foreſt of Dean.

Our own law makes it waſte to cut down high trees (though they be not properly timber) ſtanding for ſafe guard and defence of a manſion-houſe, though it be done for neceſſary repairs; whilſt yet many (and with reaſon) hold it unhealthful to ſuffer a dwelling to be choaked with trees, for want of free paſſage to the air. To remedy this, there needs only a competent diſtance to be left void. But, as a Noble Perſon * obſerves, people in theſe days are ſo diſpoſed to quarrel with timber, as there ſhall need no advice to demoliſh trees about their houſes upon this account: In the mean time, as to the incroachment of trees ſo near our dwellings for the freer intercourſe of air, the late dreadful *Silvifragi* ſtorms have cleanſed thoſe places by a remedy worſe than the diſeaſe, ſufficient to deter us from

* Lord North. Oeconom.

planting not only too near our habitations, but from priding ourſelves in our more ſtately avenues, the late boaſts of our ſeats, as by ſad experience myſelf and thouſands more have found, that there is nothing ſtable in this world which *inviſible ſpirits* cannot ſubvert and demoliſh, when God permits them to do *miſchief*, and convince thoſe who believe there are none becauſe they do not ſee, though they feel their effects.

As to the law of tithes, I find timber-trees pay none, but others do, both for body, branches, bark, fruit, root, and even the ſuckers growing out of them, and the tenth of the body ſold or kept; and ſo of Willows, Sallows, and all other trees not apt for timber: Alſo of Silva Cædua, as coppices and underwoods, the tenth is paid whenever the proprietor receives his nine parts: But if any of theſe we have named unexempted, are cut only for mounds, fencing, or plow-boot within the pariſh in which they grow, or for the fuel of the owner, no tithes are due, though the Vicar have the tithe-wood, and the Parſon that of the places ſo incloſed; nor are underwoods grubbed up by the roots tithable, unleſs for *this* and any of the former caſes there be *Preſcription*. But for timber-trees, ſuch as Oak, Aſh, Elm, (which are accounted timber in all places after the firſt twenty years) alſo Beech, Hornbeam, Maple, Aſpen, and even Haſel, (many of which are in ſome countries reputed timber) they are not to pay tithes, unleſs they are felled before the ſaid age of twenty years from their firſt planting.

See L. Biſhop of Worceſter concerning tithes of Parochial Clergy, p. 268.

Some think, and pretend, that no tithe is due where there is no annual increaſe, as corn and other grain, hay, and fruit of trees, and ſome animals; and that therefore Silva Cædua, till it become timber, is exempted: But a parliament at Sarum did make it tithable, in which are named even Willows, Alder, Beech, Maple, Haſel, &c.

In the Wild of Suſſex, tithe-wood is not paid, as for faggots; but in the Downs they pay for both, as I am told; at which I wonder, there being ſo little wood at all upon them, or likely to have ever been.——Note here,

If the owner fell a fruit-tree, (of which the Parſon has had tithe that year) and convert the wood into fuel, the tithe ſhall ceaſe, becauſe he cannot receive the tithe of one thing twice in one year.

Book III. Beech, in countries where it abounds, is not tithable, becauſe in ſuch places it is not accounted timber. 16 Jac. Co. B. Pinder's Caſe.

Cherry trees, in Buckinghamſhire, have been adjudged timber, and tithe-free. Paſch. 17 Jac. B. R.

If a tree be lopped under twenty years growth, and afterwards be permitted to grow paſt twenty years, and then be lopped again, no tithe is due for it, though at the firſt cutting it were not ſo.

If wood be cut for hedges, which is not tithable, and any be left of it unemployed, no tithe ſhall be paid for it.

If wood be cut for Hop-poles, (where the Parſon or Vicar has tithe Hops) in this caſe he ſhall not have tithe of Hop-poles.

If a great wood conſiſt chiefly of underwood tithable, and ſome great trees of Beech, or the like, grow diſperſedly amongſt them, tithe is due, unleſs the cuſtom be otherwiſe, of all, both greater and leſſer, together: And in like manner, if a wood conſiſt for the moſt part of timber-trees, with ſome ſmall ſcatterings of underwood amongſt them, no tithe ſhall be paid for the underwood or buſhes. Frin. 19 Jac. B. R. Adjudged 16 Jac. in C. B. Leonard's Caſe.

No tithe is to be paid of Common, of Eſtovers, or the Wood burnt in one's houſe.——Now as to the manner of payment:

To give the Parſon the tenth acre of wood in a coppice, or the tenth cord, provided they are equal, is a good payment, and ſetting forth of tithe, eſpecially if the cuſtom confirm it.

The tithe of maſt of Oak or Beech, if ſold, muſt be anſwered by the tenth penny; if eaten by ſwine, the worth of it. And thus much we thought fit to add concerning Predial tithes: Who has a deſire to be farther informed, may conſult Charta de Foreſta, with Manwood's Treatiſe of Foreſt Laws; Cromate on my Lord Coke's Reports, 11, 48, 49, 81. Plow. 470. Brownlow's Rep. 1 part 94. 2 part 150. D. and St. 169, &c. and that very uſeful, as well as compendious Engliſh Hiſtorical Library, part iii. chap. iv. lately publiſhed by the worthy Archdeacon, now Biſhop of Carliſle.——But let us ſee what others do.

The King of Spain has, near Bilboa, ſixteen times as many acres of coppice-wood as are fit to be cut for coal in one year; ſo that when it is ready to be felled, an officer firſt marks ſuch as are like to prove ſhip-timber, which are let ſtand, as ſo many *ſacred* and *dedicate* trees; by which means the iron-works are plentifully ſupplied in the ſame place, without at all diminiſhing the ſtock of timber. Then in Biſcay again, every Proprietor plants three for one which he cuts down, and the law obliging them is moſt ſeverely executed. See what we have already mentioned of the Duke of Lunenburg in this chapter, and that of the Walnut tree. There indeed are few or no coppices, but all are Pollards; and the very lopping, I am aſſured, does furniſh the iron-works with ſufficient to ſupport them.

What the practice is for the maintaining of theſe kind of plantations in Germany and France, has already been obſerved to this illuſtrious Society by the learned Dr. Merret, viz. that the Lords and (for the Crown-lands) the King's Commiſſioners divide the woods and foreſts into eighty partitions, every year felling one of the diviſions, ſo as no wood is felled in leſs than fourſcore years: And when any one partition is to be cut down, the Officer or Lord contracts with the buyer, that he ſhall, at the diſtance of every twenty feet, (which is ſomewhat near) leave a good, fair, ſound, and fruitful Oak ſtanding: Thoſe of betwixt forty and fifty years they reckon for the beſt, and then they are to fence theſe trees from all ſorts of beaſts and injuries for a competent time; which being done at the ſeaſon, down fall the acorns, which (with the autumnal rains beaten into the earth) take root, and in a ſhort time furniſh all the wood again, where they let them grow for four or five years, and then grub up ſome of them for fuel, or tranſplantation, and leave the moſt *probable* of them to continue for timber.

The French King permits none of his Oak woods, though belonging (ſome of them) to Monſieur, his Royal Brother, in *Appanage*, to be cut down, till his own Surveyors and Officers have firſt marked them out; nor are any felled beyond ſuch a circuit: Then are they ſufficiently fenced by him who buys; and no cattle whatſoever ſuffered to be put in till the very ſeedlings (which ſpring up of the acorns) are perfectly out of danger. But theſe, and many other wholeſome Ordinances, eſpecially as they concern the Foreſt of Dean, we have compriſed in the late ſtatute of the twentieth of his Majeſty's Reign, which I find enacted five years after the firſt Edition

Book III.

of this Treatiſe; and theſe laws are worthy our peruſal: As alſo the ſtatute preſcribing a ſcheme of proportions for the ſeveral ſcantlings of building timber, (beſides what we have already touched, book iii. chap. iv.) which you have 19 Car. II. entitled, "An Act for the rebuilding of London;" to which I refer the reader.

In the mean time, commiſſioners made purveyors for timber (though for the King's uſe) cannot, by that authority, take timber-trees growing upon any man's freehold, it being prohibited by Magna Charta, cap. xxi. *Nec nos nec Ballivi noſtri, nec alii, capiemus Boſcum alienum ad caſtra, vel ad alia agenda noſtra, niſi per voluntatem illius cujus Boſcus ille fuerit.*

We might here enlarge this title, by ſhewing how different the foreſt-laws are from the common-laws of England, both as to their antiquity, and extreme ſeverity againſt all offenders, (of what degree ſoever) till the oppreſſion was ſomewhat qualified by the *charta de foreſta*, and afterwards by yet more favourable * conceſſions; ſince, indeed, our Kings, after the rigour and example of the ſtern Northern Princes, rendered it intolerable: But much of this concerned the preſerving *Royal Game*; when as to timber trees, (like Germany) the whole iſland was almoſt but one vaſt foreſt and wood, ſo abounding, that what people might have had almoſt for carrying off the ground it grew on, is now grown ſo ſcarce in thoſe very places as that fuel is ſold by weight: I think Mr. Cambden mentions Oxfordſhire, even ſo long ſince: And here I might mention that vaſt Caledonian foreſt, heretofore in Scotland, (whence the ſea has its name, and the people Caledonians) having now not ſo much as a ſingle tree to ſhew for it. Have we not then the greateſt reaſon in the world to take all imaginable care for the preſervation and improvement of this precious material?

* Aſſiſes Foreſtæ, &c.

We have ſaid nothing of the laws againſt wood-ſtealers, (eſpecially thoſe who cut up to the very roots the moſt hopeful and thriving young Oaks, and ſell bundles of them for walking-ſtaves, &c.) ſeverely * puniſhed in other countries, but leave the reſt to our learned in the laws, craving pardon for the errors I may have fallen into, by preſuming to diſcourſe of matters out of my Element and Profeſſion.

* See Groenzung de L. L. abrog. in Hollandia ad Tit. Arbor furt Cæſar. l. ii. (One cruelly whipped at the Hague.) See alſo Carpzovius in Praxi Crim. part ii. queſt. 83. num. 2. ſeqq. and ſeveral others: The German Laws concerning Foreſts, are in abundance, and at large recited by Klochius and Pellerus.

CHAP. VII.

The Paræneſis *and* Concluſion, *containing ſome Encouragements and Propoſals for the Planting and Improvement of his Majeſty's Foreſts, and other Amænities for Shade and Ornament.* *

CH. VII.

SINCE our foreſts are undoubtedly the greateſt magazines of the wealth and glory of this nation, and our Oaks the trueſt oracles of its perpetuity and happineſs, as being the only ſupport of that navigation which makes us feared abroad, and flouriſh at home; it has been ſtrangely wondered at by ſome good patriots, how it comes to paſs, that many Gentlemen have frequently repaired, or gained a ſudden fortune, with plowing part of their parks, and ſetting out their fat grounds to Gardeners, &c. and very wild wood-land parcels (as may be inſtanced in ſeveral places) to dreſſers of Hop-yards, &c. whiles the Royal Portion lies folded up in a napkin, uncultivated and neglected, eſpecially thoſe great and ample foreſts; where, though plowing and ſowing have been forbidden, a Royal Command and Deſign may well diſpenſe with it, and the breaking up of thoſe intervals advance the growth of the trees to an incredible improvement.

It is therefore inſiſted on, that there is not a cheaper, eaſier, or more prompt expedient to advance ſhip-timber, than to ſolicit, that in all his Majeſty's Foreſts, Woods, and Parks, the ſpreading Oak, &c. (which we have formerly deſcribed) be cheriſhed, by plowing and ſowing Barley, Rye, &c. (with due ſupply of culture and ſoil between them) as far as may, without danger of the plow-ſhare, be broken up. But this is only where theſe trees are arrived to ſome magnitude, and ſtand at competent diſtances; a hundred or fifty yards, (for their roots derive relief far beyond the reach of any boughs) as do the Walnut trees in Burgundy, which ſtand in their beſt plowed-lands.

But, that we may particularize in his Majeſty's Foreſts of Dean, Sherewood, Enfield-Chaſe, &c. and in ſome ſort gratify the quæries of the Ho-

NOTES.

* This Chapter ſhould conſtitute part of the Political Catechiſm of all Stateſmen.

BOOK III.

nourable the Principal Officers and Commiſſioners of the Navy; I am adviſed by ſuch as are every way judicious, and of long experience in thoſe parts, that to encloſe would be an excellent way: But it is to be conſidered, that the people, viz. Foreſters and Borderers, are not generally ſo civil and reaſonable as might be wiſhed; and therefore to deſign a ſolid improvement in ſuch places, his Majeſty muſt aſſert his power, with a firm and high reſolution to reduce theſe men to their due obedience, and to a neceſſity of ſubmitting to their own and the publick utility, tho' they preſerved their induſtry this way, at a very tolerable rate, upon that condition; while ſome perſon of truſt and integrity did regulate and ſuperviſe the mounds and fences, and deſtine ſome portions, frequently ſet apart, for the raiſing and propagating of wood, till the whole nation were furniſhed for poſterity.

Which work, if his Majeſty ſhall reſolve to accompliſh, he will leave ſuch an everlaſting obligation on his people, and raiſe ſuch a monument to his fame, as the ages for a thouſand years to come ſhall have cauſe to celebrate his precious memory, and his Royal Succeſſors to emulate his virtue. For thus (beſides the future expectations) it would in preſent be no deduction from his Majeſty's treaſure, but ſome increaſe, and fall in time to be a fair and worthy acceſſion to it; whiles this kind of propriety would be the moſt likely expedient to civilize thoſe wild and poor Borderers, and to ſecure the vaſt and ſpreading heart of the foreſt, which, with all this indulgence, would be ample enough for a princely demeſne: And if the difficulty be to find out who *knows* or *acknowledges* what are the Borderers, this article were worthy and becoming of as ſerious an inquiſition as the legiſlative power of the whole nation can contrive.

The ſum of all is, get the *Bordures* well tenanted, by long terms, and eaſy rents, and this will invite and encourage takers; whilſt the middle, moſt ſecure, and interior parts would be a Royal Portion. Let his Majeſty therefore admit of any willing adventurers in this vaſt circle for ſuch encloſures in the precinct; and rather of more, than of few, tho' an hundred or two ſhould join together for any encloſure of five hundred acres, more or leſs; that multitudes being thus engaged, the conſideration might procure and facilitate a full diſcovery of latter encroachments, and fortify the recovery by favourable rents, improvements, and reverſions by copyhold, or what other tenures and ſervices his Majeſty ſhall pleaſe to accept of.

Now for the planting of woods in ſuch places (which is the main deſign of this whole Treatiſe) the hills and rough grounds will do well; but they are the rich fat vales and flats which do beſt deſerve the charge of walls; ſuch as that ſpot affords; and the Hawthorn well plaſhed, ſingle or double, is a better and more natural fence than unmortared walls, could our induſtry arrive to the making of ſuch as we have deſcribed: Beſides, they are laſting and profitable; and then one might allow ſufficient bordure for a mound of any thickneſs, which may be the firſt charge, and well ſupported and rewarded by the culture of the land thus encloſed.

For example: Suppoſe a man would take in five hundred acres of good land, let the mounds be of the wildeſt ground, as fitteſt for wood: Two hedges, with their vallations and trenches, will be requiſite in all the round, viz. one next to the encloſure, the other about the thicket, to fence it from cattle: This, between the two hedges, of whatſoever breadth, is fitteſt for plantations. In theſe hedges might be tried the plantation of ſtocks, in the intervals all manner of wood-ſeeds ſown, after competent plowings, as Acorns, Maſt, Fir, Pine, Nuts, &c. the firſt year chaſing away the birds, becauſe of the Fir and Pine ſeeds, for reaſons given. The ſecond year looſening the ground, and thinning the ſupernumeraries, &c. this is the moſt frugal way: Or, by another method, the waſte places of foreſts and woods (which by thorough experience is known and tried) might be perfectly cleanſed; and then allowing two or three plowings, well rooted ſtocks be ſet, cut, and trimmed as is requiſite; and that the timber-trees may be excellent, thoſe afterwards coppiced, and the choiceſt ſtocks kept ſhreaded. If an encloſure be ſowed, the ſeeds may be, as was directed, of all the ſpecies, not forgetting the beſt Pines, Fir, &c. Whiles the yearly removal of very incumbrances only will repay the workmen, who ſell the Quick, or reſerve it to ſtore other encloſures, and ſoften the circumjacent grounds to the very great improvement of what remains.

And how if in ſuch fencing-works we did ſometimes imitate what Quintus Curtius, lib. vi. has recorded of the Mardorum Gens, near to the confines of Hyrcania, who did, by the cloſe planting of trees alone upon the bordures, give ſo ſtrange a check to the power of that great Conqueror Alexander. They were a barbarous people indeed, but in this worthy our imitation, and the work ſo handſomely and particularly deſcribed, that I ſhall not grieve to recite it: *Arbores denſæ ſunt ex induſtria conſitæ, quarum teneros adhuc ramos manu flectunt, quos intortos rurſus inſerunt terræ: Inde,*

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velut ex alia radice lætiores virent trunci: hos qua natura ſert, adoleſcere non ſinunt; quippe alium alii quaſi nexu conſerunt, qui ubi multa fronde veſtiti ſunt, operiunt terram. Itaque occulti nexus ramorum velut laquei perpetuâ ſepe iter claudunt. "The trees," ſaith he, "were planted ſo near and thick together of purpoſe, that when the boughs were yet young and flexible, bent and wreathed within one another, their tops were bowed into the earth, as we ſubmerge our layers; whence taking freſh roots, they ſhot up new ſtems, which not being permitted to grow as of themſelves they would have done, they ſo knit and perplexed one within another, that when they were clad with leaves, they even covered the ground, and encloſed the whole country with a kind of living net, and impenetrable hedge." And this is not unlike what I am told is frequently practiſed in divers places of Devon; where the Oaks being planted very near the foot of thoſe high mounds, by which they ſeparate their lands, ſo root themſelves into the bank, that when it falls and crumbles down, the fence continues ſtill maintained by them with exceeding profit. Such works as theſe would become a Cato or Varro indeed, one that were *Pater Patriæ, non ſibi ſoli natus*, born for poſterity; but we are commonly of another mould:

——— *& fruges conſumere nati.*

A fair advance for ſpeedy growth and noble trees, eſpecially for walks and avenues, may be aſſuredly expected from the graffing of young Oaks and Elms with the beſt of their kinds; and where the goodlieſt of theſe laſt are growing, the ground ſhould be plowed and finely raked in the ſeaſon when the ſcales fall, that the ſhowers and dews faſtening the ſeed where the wind drives it, it may take root, and haſten, as it will, to a ſudden tree; eſpecially if ſeaſonable ſhreading be applied, which has ſometimes made them arrive to the height of twelve feet by the firſt three years; after which they grow amain. And if ſuch were planted as near to one another as in the examples we have alledged, it is almoſt incredible what a paling they would be to our moſt expoſed plantations, mounting up their *wooden walls* to the clouds. And indeed the ſhelving and natural declivity of the ground more or leſs to our unkind aſpects, and bleak winds, does beſt direct to the thickening of theſe protections; and the benefit of that ſoon appears, and recompences our induſtry in the ſmoothneſs and integrity of the plantations ſo defended.

That great care be had of the ſeeds which we intend to ſow, has been already adviſed; for it has been ſeen that woods of the ſame age, planted

in the ſame ſoil, diſcover a viſible difference in the timber and growth; and where this variety ſhould happen, if not from the ſeed, will be hard to interpret; therefore let the place, ſoil, and growth of ſuch trees, from whence you have your ſeeds, be diligently examined; and why not this, as well as our care of animals for breed and ſtore?

As to the form, obey the natural ſite, and ſubmit to the ſeveral guiſes; but ever decline to encloſe highways and common roads as much as poſſible. For the reſt, be pleaſed to reflect on what we have already ſaid to encourage the planting of the large ſpreading Oak above all that ſpecies; let the amplitude of the *diſtance* which they require be reſigned to the care of the Verderer, for graſing cattle, deer, &c. Trees planted in this manner form, as it were, a wild Quincunx which preſents to the eye a great and maſculine beauty.

But to advance the Royal Foreſts to this height of perfection, I ſhould again urge the removal of ſome of our moſt miſchievouſly placed iron-mills; if that at leaſt be true which ſome have affirmed, that we had better iron, and cheaper from foreigners, when thoſe works were ſtrangers amongſt us. I am informed that the *New-Engliſh* (who are now become very numerous, and hindered in their advance and proſpect of the continent by their ſurfeit of the woods, which we want) did, about twelve years ſince, begin to clear their highways by two iron-mills. I am ſure their *zeal* has ſufficiently waſted our ſtately *Woods*, and *Steel* in the bowels of their *Mother Old-England*; and it were now but expedient their *Brethren* ſhould haſten thither to ſupply us with iron for the peace of our days, whilſt his Majeſty becomes the great Sovereign of the *Ocean*, and of *free Commerce*; *Nemorum Vindex & Inſtaurator magnus*. This were the only way to render *both* our countries habitable indeed, and the fitteſt ſacrifice for the Royal Oaks, and their Hamadryads, to whom *they* owe more than a ſlight ſubmiſſion: And he that ſhould deeply conſider the prodigious waſte which theſe voracious iron and glaſs-works have formerly made but in one county alone, the county of Suſſex, for one hundred and twenty miles in length, and thirty in breadth, (for ſo wide and ſpacious was the antient *Andradſwald*, of old one entire wood, but of which there remains now little or no ſign) would be touched with no mean indignation. I named the Suſſex glaſs-works; but what ſpoil and prodigious conſumption the ſalt-works had made in Worceſterſhire, ſee the complaint of Mr. Cambden, ſpeaking of Feckenham-Foreſt in his days, now neceſſitated to uſe other coal; certainly the goodly

BOOK III. rivers and foreſts of the other *World* would much better become theſe deſtructive works, our *Iron* and *Saw-mills*, than theſe exhauſted countries, and we prove gainers by the timely removal: I have ſaid this already, and I cannot too often inculcate it for the concerns of a nation, whoſe only protection, under God, are her *Wooden Walls*.

Another thing to be recommended (and which would prove no leſs than thirty, in ſome places forty, and generally twenty years advance) were a good, if well executed, act to ſave our ſtandards and bordering trees from the ax of the neighbourhood: And who would not preſerve timber, when within ſo few years the price is almoſt quadrupled? I aſſure you ſtandards of twenty, thirty, or forty years growth, are of a long day for the concernments of a nation.

And tho' we have, in our general chapter of coppices, declared what by our laws and common uſage is expected at every fell, (and which is indeed moſt requiſite, till our ſtore be otherwiſe ſupplied) yet might much even of that rigour be abated, by no unfrugal permiſſions to take down more of the ſtandards for the benefit of the underwoods, (eſpecially where, by over-dropping and ſhade, they interrupt the kindly dews, rains, and influences which nouriſh them) provided that there were a proportionable number of timber-trees duly and thoroughly planted and preſerved in the hedge-rows and bordures of our grounds; in which caſe, even the total clearing of ſome coppices would be to their great advance, as by ſad experience has been taught ſome good huſbands, whoſe neceſſities ſometimes forced them to violate their ſtandards, and more grown trees, during the late Tyranny.

Nor will it be here unſeaſonable to adviſe, that where trees are manifeſtly perceived to decay, they be marked out for the ax, that ſo the younger may come on for a ſupply, eſpecially where they are chiefly Elms, becauſe their ſucceſſors haſten to their height and perfection in a competent time; but beginning once to grow ſick of age, or other infirmity, ſuddenly impair, and loſe much of their value yearly; beſides, that the increaſe of *this*, and other ſpeedy timber, would ſpare the Oak for navigation and the ſturdier uſes.

How goodly a ſight were it, if moſt of the demeſnes of our Country Gentlemen were crowned and incircled with ſuch ſtately rows of Limes,

Firs, Elms, and other ample, ſhady, and venerable trees as adorn New-Hall in Eſſex, the ſeat of that Suffolk Knight, near Yarmouth; our neighbouring paſtures at Barnes; with what has been planted of later years by the Illuſtrious Marquis of Worceſter; the moſt accompliſhed Earl of Eſſex; and even in leſs fertile ſoils, though purer air, at Euſton, by the Right Hon. the Earl of Arlington, Lord Chamberlain of his Majeſty's Houſhold; and at Cornbury, by the late Lord Chancellor, the Earl of Clarendon; and is done nearer this imperial city by the Earl of Danby, late Lord High Treaſurer of England, at Wimbleton; the Noble Earl of Rocheſter (ſucceeding him in that ſupreme Office) at New-Park; the Duke of Norfolk at Albery, now the Lord Guernſey's; Sir Robert Cooke at Durdence, at Epſom, now my Lord Barkley's; and at Bedington, an antient ſeat of the Carews, famous for the firſt Orange trees planted in the naked earth one hundred years ſince, and ſtill flouriſhing.

Beſides what might have been ſeen, (as by me they were in perfection and with admiration) the Royal Seats of Oatland, Richmond, and above all Nonſuch, deſcribed by the judicious Cambden, with deſerved Eulogies.

All theſe, and more, in my own ſweet county of Surry, inferior to none for pleaſure and ſalubrity of the air; to which we add the princely Seyourns of the adjoining county, Eltham and Greenwich, for its park and proſpect, not only emulous, but in many reſpects exceeding that of the famous Thraſian Boſphorus from Conſtantinople: That palace, namely at Greenwich, now turned into a ſtately and capacious college (the incomparable work of that accompliſhed architect Sir Chriſtopher Wrenn) of which I had the honour to lay the firſt foundation ſtone, as the Firſt Treaſurer of that royal ſtructure, erected for the reception and encouragement of emerited and well-deſerving ſeamen and mariners, for its glorious fabrick and conveniencies exceeding any in Europe dedicated to that excellent purpoſe. To this alſo belongs a Park, as there did to that of Eltham. Nearer the metropolis yet are thoſe of St. James's, Hyde-Park, and that ſweet Villa (as now built, planted, and embelliſhed) of Kenſington, deſerving a particular deſcription; and for all that can be deſirable of maggnificence, Hampton Court, truly great, in a moſt beautiful Flat; the palace, gardens, canal, walks, groves, and parks; the ſweet and ſilent Thames gliding her ſilver ſtreams to the triumphal Winſonian Tempe, raiſing its ſtately head, and which alone has in view an

BOOK III. hemiſphere as far as eyes and teleſcopes can diſtinguiſh earth from heaven; thus from the Keape, the Terrace, Parks, and Foreſts, equalling, nay exceeding, any thing Europe can boaſt of.

Other there are ſweet and delectable country ſeats and villas of the Nobleſs, rich and opulent citizens, (about our Auguſta) built and environed with parks, paddocks, plantations, &c. adapted to country and rural ſeats, diſperſed through the whole nation, conſpicuous not only for the ſtructure of their houſes, built after the beſt rules of architecture, but for ſituation, gardens, canals, walks, avenues, parks, foreſts, ponds, proſpect and viſtas, groves, woods and large plantations, and other the moſt charming and delightful receſſes, natural and artificial: But to enumerate and deſcribe what were extraordinary in theſe and the reſt, would furniſh volumes: For who has not either ſeen, admired, or heard of

Audly-End, Althorp, Awkland, Allington, Amphill, Aſtwell, Aldermaſton?

Bolſover, Badminton, Breckly, Burghly on the Hill, and the other Burghly, Bockton, Buckhurſt, Buckland, Bellroiro, Blechington, Beſtwood, Broom-hall?

Caſtle-Riſing, Caſtle-Aſhby, Chatſworth, Charſley, Cornbery, Caſiabery, Cobham, Cowdrey, Caverſham, Cranburn-Park, Charlton, Copt-Hall, Claverton, famous for Sir W. Baſſet's vineyard, producing forty hogſheads of wine yearly. Nor muſt I forget that of Deepden, planted by the Honourable Charles Howard, of Norfolk, my worthy neighbour in Surry?

Drayton, Dorington-Park, Dean?

Eaſtwell, Euſton, Eccleſwold, Edſcomb, Eaſton, Epping?

Falſton, Flankford?

Grayſtock, Goodrick, Grooby, Grafton, Golden-Grove?

Holdenby, Haddon, Hornby, Hatfield, Haland, Hoathfield, Hinton, Holm-Pierpoint, Horſtmounceaux?

Ichingfield?

Kirby, Knoweſby?

Longleat, Latham, Lenſal, Latimer, Lawnſbourgh?

More-Park, Mulgrave, Marlborough?

Normanby, North-Hall, Norborough, Newnham?

St. Oſtlo, Oxnead?

Petworth, Penſhurſt, Paſton-Hall?

Quarendon, Quickſwood?
Ragland, Rutford, Ragbey, Ricot?
Sherborn, Sherley, Swallowfield, Shasford, Shaftſbury, Stanſted, Scots-Hall, Sands of the Vine?
Theobalds, Thorn-kill, Thorny?
Up-Park?
Wilton, Wreſt, Woburn, Welbeck, Workſop, Woodſtock, which, as Cambden tells us, was the firſt Park in England; as it is like to be one of the moſt magnificent and princely palaces and ſeats of that illuſtrious Hero, his Grace the Duke of Marlborough, to whoſe courage and conduct not the ſafety of the Empire alone, but of Europe is due, whilſt the actions at Blenheim and Schellemberg may challenge equal trophies with Miltiades and Cæſar, at Marathon and Pharſalia.——But to proceed, Wimburn, Writtle-Park?

And generally all thoſe ſeats which go under the names of Caſtles and Halls, as in Yorkſhire, Eſſex, &c. were ſtored with noble parks full of timber, omitted here; which, but to have named, would over-ſwell the alphabet; without reckoning thoſe of Ireland, which a few years ſince was an inexhauſtible magazine of timber, deſtroyed by the Cromwellian Rebels, not only in that kingdom, but through all England: As to parks, there were more in this nation than in all Europe beſide: And moſt of all that catalogue above-named, have yet their parks full of good timber-trees, induſtriouſly improved by the owners, ſince the ſpoil of the late Uſurpers and Sequeſtrators.

To theſe ſhould I add the vaſt foreſts, (moſt of them belonging to the Crown) as that of Dean, New-Foreſt, Windſor, Aſhdown, Leonard, Sherewood, Epping, Panbet, Chute, &c. Foreſts for the moſt part without trees, and ſeveral of them together heretofore comprehended in that vaſt *Andradſwald* already mentioned, of one county only. There were formerly twenty groves in Clarendon-Park near Saliſbury, celebrated by Meſokerus, cited by Cambden, that were every one of them a mile in compaſs. In a word, to give an inſtance of what ſtore of woods, and timber of prodigious ſize, there were growing in our little county of Surry, (with ſufficient grief and reluctancy I ſpeak it) my own Grandfather had ſtanding at Wotton, and about that eſtate, timber that now were worth 100,000 l. Since of what was left my father, (who was a great preſerver of wood) there has been 30,000 l. worth of timber fallen by the ax, and

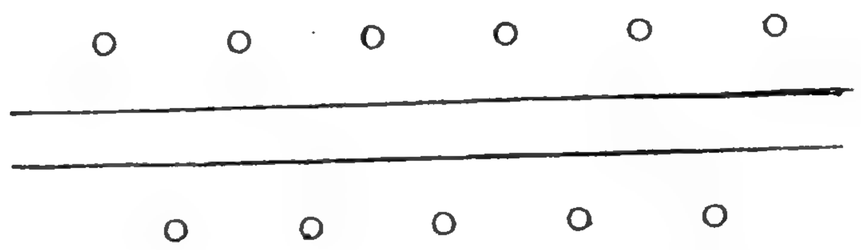
BOOK III. the fury of the late hurricane and ſtorm: Now no more Wotton, ſtripped and naked, and aſhamed almoſt to own its name.

All which conſidered (for there are many other places and eſtates which have ſuffered the like calamity) ſhould raiſe, methinks, a new ſpirit of induſtry in the Nobility and Gentry of the whole nation, like that with which Nehemiah inſpired the Nobles as well as the People of the Captivity (than which nothing ſo much reſembled that tedious ſlavery, and return from it, than did the Reſtoration of King Charles II.) *Let us ariſe up*, ſays the brave man, *and build*; *and ſo they ſtrengthened their hands, for the people had a mind to the work.* And ſuch an univerſal ſpirit and reſolution to fall to planting, for the repairing of our wooden walls and caſtles, as well as of our eſtates, ſhould truly animate us: *Let us ariſe then and plant*, and not give it over till we have repaired the havock our barbarous enemies have made: Pardon then this zeal, O ye lovers of your country, if it have tranſported me! To you Princes, Dukes, Earls, Lords, Knights, and Gentlemen, Noble Patriots, as moſt concerned, I ſpeak, to encourage and animate a work ſo glorious, ſo neceſſary.

Nehem. c. ii. v. 18.

Of the noble Foreſt of Norimberg and its privileges, ſuch care has been taken by many Emperors, that the very models of the plows are ſtill preſerved, drawn by above an hundred horſes, (it being two hundred years ſince this Royal Plantation was begun) wiſely preſaging what ravage might be made by the ſpoil which the wars have ſince cauſed in that goodly country; which being then an almoſt continual foreſt, is now ſo ſadly waſted. Nor has this been the fate of Germany alone, but of all the moſt flouriſhing parts of Europe, through the execrable and unſatiable ambition of thoſe who have been the occaſion of the ruin not only of theſe venerable ſhades, ſtately trees and avenues, (the graceful ornaments of the moſt princely ſeats) but of the miſerable deſolation of entire provinces, which their legions have left, with the inhuman murders of ſo many Chriſtians, without diſtinction or juſt provocation! Miſchiefs not to be repaired in many ages, the trucident and ſavage marks, among others, of a moſt *Chriſtian King*, *Nomine non Re!* In the mean time, what proviſion this demoliſher of woods in other countries makes to furniſh and ſtore his own dominions with ſo neceſſary a material, we have mentioned in this chapter; and how impolitick a waſte there was of timber in France in John Bodin's time, ſee Repub. lib. vi. cap. i.

But leaving this ſad and melancholy proſpect, I return to the effects of peace, and it ſhall be to that plantation of Elms, carried out of England by Philip II. of Spain, to adorn his Royal Palace at Aranjuez, (of which I have already ſpoken, lib. i. cap. iv.) near Madrid in Spain: The palace is ſeated on the banks of the famous river Tagus, and the plantation on the north, where there is a piece of ground incloſed, formed into walks of ſix hundred and eighty yards long, and three hundred in breadth, in ſhape of a trapezium or parallelogram, about which the Tagus is artificially drawn to fence it. Next the river-ſide are more walks, not above twenty feet in breadth, for cloſer ſhade, planted on each ſide with double ranks of Elm, ſome of which are forty yards high, ſtript up to the top, and ſo near ſet as fifteen feet ſpace: The ſecond row is about ſix feet diſtant from the other; not planted exactly againſt its uſual oppoſite, but the interval; and through the ſpace between glides a narrow ſhallow channel of water, to refreſh the trees upon occaſion; thus,



Which is the method uſed in may ridings of Elm-walks, ſome of which are a league in length, adorning this ſeat beyond any palace, ſome think, in the world. Many of theſe indeed are on the decay, prejudiced by their being planted ſo near one another; but for all that, it takes not much from the beauty of the Viſta, which is certainly the moſt ſurprizingly agreeable; to which the ample fountain, and noble ſtatues in the croſs-walks, make ſo glorious an addition as would require a particular deſcription.

And now do I not for all this ſo magnify it, as if not to be paralleled in our own country; where, I dare affirm, there are many that exceed it, both in form and planting, (which has there ſeveral defects) but as we ſaid, for an exotick example, ſo admired and celebrated by that boaſting nation, as if the univerſe could not ſhew the like.

And what, in the mean time, can be more delightful than for noble perſons to adorn their goodly manſions and demeſnes with trees of venerable ſhade, and profitable timber? By all the rules and methods imaginable, to cut and diſpoſe thoſe ampler incloſures into lawns and ridings for exer-

BOOK III.

cife, health, and proſpect, and for which I ſhould here preſume to furniſh ſome farther directions, were it not already done to my hand by the often-cited Mr. Cooke, in that uſeful work of his; where, in the thirty-eighth chapter, he has laid down all that I can conceive neceſſary, by meaſures exactly taken from the middle line of any front, following the centre-ſtake, if it be for a walk: He there determines the wideneſs of the walk, according to its length, as forty feet to one of half a mile; if more, fifty or ſixty; and if you withal deſire ſhade, that then you ſhould make three walks, the two collaterals twenty feet broad, to a middle one of forty, twenty-five to fifty, ſo that the middle be as wide as both the other: He likewiſe ſhews how proper it is that walks ſhould not terminate abruptly, but rather in ſome capacious or pretty figure, be it circle, oval, ſemi-circle, triangle, or ſquare, eſpecially in parks, or where they do not lead into other walks; and even in that caſe, that there may gracefully be a circle to receive them: There he ſhews how to pierce a walk through the thickeſt wood, either by ſtakes ſet up where they may be ſeen to direct, or by candle and lanthorn in a calm night: He alſo gives the diſtances of the trees in relation to each other, according to the ſpecies, and ſhews how neceſſary it is to plant them nearer in thoſe ovals, circles, and ſquares, for the better diſtinction of the figures, ſuppoſe to half the diſtance of that of the walks, and proportionable to the amplitude or ſmallneſs thereof. As for lawns, he adviſes that they ſhould, if poſſible, be contrived on the ſouth or eaſt ſide of the ſeat or manſion, for avoiding the impetuouſneſs of weſtern winds; and that your beſt rooms may front thoſe lawns and openings, and to ſkreen from the occidental and afternoon's ſun, which alſo hinders the proſpect: A lawn on the north expoſes the houſe to that piercing quarter, and therefore it ſhould be well defended with the talleſt trees: For the figure he commends the ſquare, with three avenues breaking out at the three angles, or one at the angle oppoſite to the houſe; and theſe lawns may be bounded with walks, or a ſingle row of Lime trees at competent diſtance: To which I add, the circle, with a ſtar of walks radiating from it, likewiſe exceeding pleaſant; ſuch as the Right Hon. the Earl of Winchelſea has cut out at his noble ſeat in Kent; and ſince, far exceeding the moſt, at Long-Leats, the ſtately palace of the Lord Viſcount Weymouth; at Badminton, the Duke of Beaufort's princely ſeat in Glouceſterſhire; at Ackdowne-Park in Berks, a moſt delightful ſolitude, from the centre of a large wood belonging to the Lord Craven; and in Worceſterſhire at Weſtwood, the manſion of Sir John Packington; beſides thoſe mentioned by Dr. Plot in his Natural Hiſtory of Staffordſhire, with many others; moſt of

which have been graphically plotted and deſigned (together with the ſeats, gardens, fountains, piſcinas, plantations, avenues, viſtas, and proſpects about them) by Mr. Kniff, in near an hundred copper-plates; a moſt laudable undertaking, and becoming the encouragement of thoſe noble perſons, who would do honour to themſelves, their families, and the whole nation.

But theſe incomparable amenities and undertakings will beſt of all become the inſpection and care of the noble Owners, Lieutenants, Rangers, and ingenious Gentlemen, when they delight themſelves as much in the goodlineſs of their trees, as other men generally do in their dogs and horſes, for races and hunting; neither of which recreations is comparable to that of planting, either for virtue or pleaſure, were things juſtly conſidered according to their true eſtimation: Not that I am of ſo moroſe a humour, that I reprove any of theſe noble and manly diverſions, ſeaſonably uſed; but becauſe I would court the induſtry of great and opulent perſons to profitable and permanent delights: For, ſuppoſe *that* ambition were changed into a laudable emulation, who ſhould beſt, and with moſt artifice, raiſe a plantation of trees, that ſhould have all the proper ornaments and perfections their nature is ſuſceptible of, by their direction and encouragement; ſuch as Ælian ſums up, lib. iii. cap. xiv. εὐγενεῖς οἱ κλάδοι, καὶ ἡ κόμη πολλὴ, &c. kind and gentle limbs, plenty of large leaves, an ample and fair body, profound or ſpreading roots, ſtrong againſt impetuous winds, (for ſo I affect to read it) extenſive and venerable ſhade, and the like: Methinks this were as much a ſubject of glory as could be fancied of the kind; and comparable, I durſt pronounce preferable, to any of their recreations; and how goodly an ornament to their demeſnes and dwellings, let their own eyes be the judges.

One encouragement more I would reinforce from an hiſtory I have read of a certain frugal and moſt induſtrious Italian Nobleman, who, after his Lady was brought to bed of a daughter, (conſidering that wood and timber was a revenue coming on whilſt the owners were aſleep) commanded his ſervants immediately to plant in his lands, which were ample, Oaks, Aſhes, and other profitable and marketable trees, to the number of an hundred thouſand; as undoubtedly calculating, that each of thoſe trees might be worth twenty-pence, before his daughter became marriageable, which would amount to 100,000 Francs, (near ten thouſand pounds ſterling) and this he intended to be given with his daughter for a portion. This

Book III. was good philoſophy, and ſuch as I am aſſured was frequently practiſed in Flanders upon the very ſame account: Let us ſee it once take effect amongſt our many ſlothful Gentry, who have certainly as large demeſnes, and yet are ſo deficient in that decent point of timely providing for their numerous children; and thoſe who have none, let them the rather plant: Trees and Vegetables have perpetuated ſome names longer and better than a pedigree of a numerous offspring, as I have already ſhewed; and it were a pledge of a noble mind, to oblige the future age by our particular induſtry, and by a long laſting train, with the living work of our own hands. But I now proceed to more general concerns in order to the Quæries; and firſt to the proportion:

It were but juſt, and infinitely befitting the miſerable needs of the whole nation, that every twenty acres of paſture made an allowance for half an acre of timber; the ground dug about Chriſtmas, caſting the graſſy-ſide downwards till June; then dug again, and about November ſtirred afreſh, and ſown with maſt, or planted in a clump, well preſerved and fenced for fourteen or fifteen years, unleſs that ſheep might haply graze after four or five years: And where the young trees ſtand too thick, there to draw and tranſplant them into the hedge-rows, which would alſo prove excellent ſhelter for the cattle: This huſbandry would more eſpecially become Northamptonſhire, Lincolnſhire, Cornwall, and ſuch other of our countries as are the moſt naked of timber, fuel, &c. and unprovided of covert; for it is rightly obſerved, that the moſt fruitful places leaſt abound in wood, and do the moſt ſtand in need of it:

1.

Example by Leiceſterſhire;
What ſoil can be better than that
For any thing heart can deſire?
And yet doth it want ye ſee what;
Maſt, covert, cloſe paſture, and wood,
And other things needful, as good.

2.

More plenty of mutton and beef,
Corn, butter, and cheeſe of the beſt,
More wealth any where (to be brief)
More people, more handſome, and preſt,

Where find ye (go ſearch any coaſt)
Than there where incloſure is moſt?

3.

Moze woꝛk for the labouring man,
As well in the town as the fiꝛld;
Oꝛ thereof (deviꝛe, if ye can)
More profit what countries do yield?
More ſeldom where ſee ye the poor
Go begging from dooꝛ to dooꝛ?

4.

In wood-land the pooꝛ men that have
Scarce fully two acres of land,
More merrily live, and do ſave
Than t'other with twenty in hand:
Yet pay they as much foꝛ the two
As t'other foꝛ twenty muſt do.
If this ſame be true, as it is,
Why gather they nothing by this?

Thus honeſt Tuſſer, above an hundred years ſince, and the whole age has juſtified it; ſince it is evident, that by incloſure, and this diligent culture, the very worſt Land of England would yield tenfold more profit than that which is here celebrated for the beſt and richeſt ſpot of it.

Such as are ready to tell you their lands are ſo wet that their woods do not thrive in them, let them be converted to paſture, or beſtow the ſame induſtry on them which good huſbands do in meadows by *draining*; which inſtead of thoſe narrow rills (gutters rather) might be reduced to a proportionable canal, cut even and ſtraight, the earth taken out and ſpread upon the weeping and uliginous places; nor would the charge be ſo much as that of the yearly and perpetual renewing and cleanſing of thoſe numerous and irregular ſluices; beſides, there is a profit in ſtoring the canal with fiſh.

It is a ſlothfulneſs to do otherwiſe, ſince it might be effected in few years, by continually, and by degrees making the middle cut large, where it cannot be ſo conveniently done at once, and the pains would certainly

Book III. be as fully recompenſed in the growth of their timber as in that of their graſs: Where poor hungry woods grow, rich corn, and good cattle would be more plentifully bred; and it were beneficial to convert ſome woodland (where the proper virtue is exhauſted) to paſture and tillage, provided that freſh land were improved alſo to wood in recompence, and to balance the other.

Where we find ſuch *uliginous* and ſtarved places, (which ſometimes obey no art or induſtry to drain, and of which our pale and fading corn is a ſure indication) we are as it were courted to obey nature, and improve them from the propagation of Sallows, Willows, Alders, Abele, Black-Cherry, Sycamore, Aſpen, Birch, and the like haſty and profitable growers, by ranging them, caſting of ditches, trenches, &c. as before has been taught.

In the mean while, it is a thing to be deplored that ſome perſons beſtow more in grubbing and dreſſing a few acres, which have been excellent wood, to convert them into wretched paſture, not worth a quarter of what the trees would have yielded, well ordered, and left ſtanding, ſince it is certain, that barren land planted with wood will treble the expence in a ſhort time. Of this, the Right Honourable the Lord Viſcount Scudamore may give fair proof, who having felled (as I am credibly informed) a decayed wood, intended to ſet it to tenants; but upon ſecond thoughts (and for that his Lordſhip ſaw it apt to caſt wood) incloſed and preſerved it. Before thirty years were expired it yielded him near 1000l. upon wood-falls, whereas the utmoſt rent of the whole piece of land yearly was not above 8l. 10s. The like I am able to confirm by inſtancing a Noble Perſon, who, a little before our unhappy wars, having ſown three or four acres with acorns, the fourth year tranſplanted thoſe which grew too thick, all about his Lordſhip. Theſe trees are now* of that ſtature, and ſo likely to prove excellent timber, that they are already judged to be almoſt as much worth as the whole demeſne; and yet they take off nothing from other profits, having been diſcreetly diſpoſed of at the firſt deſignment. And ſuppoſing the longevity of trees ſhould not extend to the periods we have, upon ſo good account, produced; yet, neither is their arrival to a very competent perfection ſo very diſcouraging: ſince I am credibly informed, that ſeveral perſons have built of timber, and that of Oak, which were acorns within theſe forty years; and I find it credibly reported, that even our famous Foreſt of Dean hath been utterly

* 1664.

wasted no less than three several times within the space of nine hundred years. The Prince Elector, Frederick IV. in the year 1606, sowed a part of that most barren heath of *Lambertheim* with acorns after plowing, as I have been informed: It is now* likely to prove a most goodly forest, though all this while miserably neglected by reason of the wars. For the care of planting trees should indeed be recommended to Princes and great Persons, who have the fee of the estate; tenants upon the rack, by reason of the tedious expectation, and jealousy of having their rents enhanced, are, for the most part, averse from this Husbandry; so that unless the Landlord will be at the whole charge of planting and fencing, (without which as good no planting) little is to be expected; and whatsoever is proposed to them above their usual course, is looked upon as the whim and fancy of speculative persons, which they turn into ridicule when they are applied to action; and this (says an ingenious and excellent Husband, whose observations have afforded me no little treasure) might be the reason why the prime writers of all ages endeavoured to involve their discourses with allegories, and ænigmatical terms, to protect them from the contempt and pollution of the Vulgar, which has been of some ill consequence in husbandry; for that very few Writers of worth have adventured upon so plain a subject, though doubtless, to any considering person, the most delightful kind of Natural Philosophy, and that which employs the most useful part of the Mathematicks.

* 1664.

The Right Honourable the late Lord Viscount Mountague has planted many thousands of Oaks, which, I am told, he drew out of coppices, big enough to defend themselves; and that with such success as has exceedingly improved his possessions; and it is a worthy example. To conclude, I could have shewn an avenue planted to a house standing in a barren park, the soil a cold clay; it consisted totally of Oaks, one hundred in number: The person who first set them, dying very lately, lived to see them spread their branches one hundred and twenty-three feet in compass, which, at the distance of twenty-four feet, mingling their shady tresses for above a thousand in length, formed themselves into one of the most venerable and stately arbor-walks that in my life I ever beheld: This was at Baynards in Surry, and belonging lately to my most honoured Brother (a most industrious planter of wood) Richard Evelyn, Esq;——since transplanted to a better world: The walk is fifty-six feet broad, one tree with another containing, by estimation, three quarters of a load of timber, and in their lops three cords of fire-wood: Their bodies were not of the tallest,

Book III. having been topped when they were young, to reduce them to an uniform height; yet was the timber moſt excellent for its ſcantling; and for their heads, few in England excelling them: Where ſome of their contemporaries were planted ſingle in the park without cumber, they ſpread above fourſcore feet in arms; all of them ſince cut down and deſtroyed by the perſon who continued to detain the juſt poſſeſſion of that eſtate from thoſe to whom of right and conſcience it belonged. Since then it is diſpoſed of, and I am glad it has fallen into the hands of the preſent Poſſeſſor.

But I have ſome few inſtances to ſuperadd, of no mean encouragement, before I diſmiſs my Reader, becauſe they are ſo very pregnant and authentick. Sir Thomas Southwell, after he had ſold and felled all the timber and underwood in a certain parcel of land lying in Carbrook, in the county of Norfolk, called by the name of *Latimer-Wood*, containing eighty acres, (now, as I underſtand, belonging to Sir Robert Clayton, Knight) granted a leaſe of the ſaid ground, with other land, to one Thomas Waſtney, the father, with liberty to grub and ſtub up all the wood and ſtub-ſhoots remaining, and to clear the ſaid ground for paſture or tillage, as he ſhould think to be moſt for his profit and advantage: Accordingly he puts out the ſame to labourers to ſtub and clear; but was, it ſeems, perſuaded by one of them, to preſerve ſome of the young ſtands or ſaplings then growing there, as that which might be of greater emolument to him before the expiration of the leaſe, than if he ſhould quite extirpate them, and convert the ſaid ground to tillage; theſe ſaplings were then ſo ſmall, as when it happened that any of the labourers did break the haft of his mattock, he could hardly find one amongſt them big enough to make another of for his preſent uſe: Nay, when the ſaid labourers had made an end of clearing the ground of the old ſtub-ſhoots, upon which the timber and underwood did grow, (which is now fifty years ſince) there was not a tree left growing in it, that could be valued at above threepence, to be felled for any uſe or ſervice. About the year 1650, the eſtate being then come (after the death of Sir Richard Crane, Knight) to William Crane, Eſq; and the leaſe of the ſame to Thomas Waſtney, the ſon, he offered five hundred of the beſt of the ſaid young Oak ſaplings to one Daniel Hall, a dealer in timber, for two ſhillings and ſixpence the tree; which he refuſing to give, the ſaid Thomas Waſtney making his application to Mr. Crane above-mentioned, (then owner of the eſtate) and deſiring Daniel Hall to acquaint him what pity it was to cut down ſuch young and thriving trees, Mr. Crane was perſuaded to allow the ſaid Thomas Waſtney

fourſcore pounds to let them ſtand; ſince which time, the ſaid Mr. Crane ſold as many of thoſe trees and ſaplings as came to about forty pounds, and left growing, and remaining on the ground, about thirteen hundred and eighty trees; which, in Auguſt 1675, being (upon the deſire of Mr. Crane) valued by the ſaid Daniel Hall, were eſtimated to be worth 700l. himſelf ſince offering for ſome of the ſaid trees forty or fifty ſhillings a tree; five hundred of them being better worth than 500l. Now the ſaid Latimer-Wood, were it cleared of the timber, would not be let for above four or five ſhillings per acre at the moſt. The particulars of this hiſtory I received under the hands and certificates of the above-mentioned Daniel Hall, who is the Timber-merchant, and two of the ſtubbers or labourers, yet living, that were employed to clear the ground. I have likewiſe tranſmitted to me this account from Mr. Sharp, under the hand of Robert Daye, Eſq; one of his Majeſty's Juſtices of the Peace for the county of Norfolk, as followeth:

There were, in 1636, an hundred timber-trees of Oak, growing on ſome grounds belonging then to Thomas Daye, of Scopleton, in the county of Norfolk, Eſq; which were that year ſold to one Robert Bowgeon of Hingham, in the ſaid county, for 100l. which price was believed to be equal, if not to ſurmount their intrinſic worth and value; but, after agreement made for them, a refuſal happening, (which continued the trees ſtanding till the year 1671) thoſe very trees were ſold to Thomas Ellys of Windham, Timber-maſter, and one Henry Morley, Carpenter, by Mr. Daye (ſon of the ſaid Thomas Daye, Eſq;) for 560l. And this comes to me atteſted under the hand of Mr. Daye himſelf, dated May 4, 1678. *

From the ſame Mr. Sharp I receive this inſtance of an Aſh planted by the hands of one Mr. Edm. Salter, in that county, which he ſold for 40s. before his death; but this is frequent.

I am likewiſe aſſured that three acres of barren land, ſown with acorns about ſixty years ſince, are now become a very thriving wood: The improvement of thoſe few acres amounts to 300l. more than the rent of the land, and what it was before worth to be ſold. Once more, and I have done.

NOTES.

* A few years ago, one hundred Oak Trees growing in the park at Noſtell, the ſeat of Sir Rowland Winn, Bart. were ſold for 5000l.

Book III. Upon the eſtate of George Pitt, Eſq; of Stratfeildſea, in the county of Southampton, a ſurvey of timber being taken in the year 1659, it came to 10,300 l. beſides near 10,000 ſamplers not valued, and growing up naturally: Since this, there hath been made by ſeveral ſales 5600 l. and there has been felled for repairs, building, and neceſſary uſes, to the value (at the leaſt) of 1200 l. ſo as the whole falls of timber amount to 6800 l. The timber upon the ſame ground being again ſurveyed *Anno* 1677, appeared to be worth above 21,000 l. beſides eight or nine thouſand ſamplers and young trees to be left ſtanding, and not reckoned in the ſurvey: But what is yet to be obſerved, moſt of this timber above-mentioned, being Oak, grows in hedge-rows, and ſo as that the ſtanding of it does very little prejudice to the plough or paſture.

It is likewiſe affirmed, that upon a living in the ſame place, of about 40 l. rent *per Ann.* there were (by an eſtimation taken in the year 1653) three hundred thirty-eight young timber-trees, valued at 59 l. the ſaplings at 31 l. 14 s. And upon a later ſurvey, taken the laſt year, 1677, the worth of the timber on that living is valued at above 800 l. beſides four or five hundred young thriving trees, which have, ſince the ſurvey in 1653, grown naturally up, not reckoned in this account. With ſuch, and the like inſtances, coming to me from Perſons and Gentlemen of unqueſtionable credit, (diſperſed through ſeveral other counties of this nation) I might furniſh a juſt volume; and I have produced theſe examples becauſe they are conſpicuous, full of encouragement, worthy our imitation; and that from theſe, and ſundry others which I might enumerate, we have made this obſervation, that almoſt any ſoil is proper for ſome profitable timber-trees or other, which is good for very little elſe.

Beſides common paſture which has long been fed and is the very beſt meadow, that is up-land and rich, and ſuch as we find to be naturally *Wood-ſeere*, as they term it, the bottoms of Downs, and like places well plowed and ſown, will bear luſty timber, being broken up, and let lie till Midſummer, and then ſtirred again before ſowing about November.

Mr. Cooke's directions are theſe: Prepare as for ſowing of barley; about February ſcatter your ſeeds: If you plow your ground into great ridges, the thickneſs of the earth on the top will afford more depth and nouriſhment for the roots, and the furrows being filled up with leaves, when rotten, will lead the roots from one ridge to another: In dry ground

plow the ridges croſs the deſcent, not to drain, but keep the water on the ground; but in wet lands, contrary: This I hold to be an excellent note: He conceives the barley ſeaſon to be of the lateſt to ſow your ſeeds, but with oats it does well, ſo you ſow them not too thick; but it is beſt of all to ſow them by themſelves, without any crop of grain at all.

A more expeditious way is to plant with ſets, making holes or foſſes (which are beſt) two feet wide, and deep, and about half a rod diſtant, viz. four in every rod ſquare, two ſets in each hole, ſowing your keys and ſeeds among them the enſuing ſpring, and that continued as oft as you find *ſtampings* and *keys* to be had, even till your wood be perfectly furniſhed, only taking care that they lie not long too thick, becauſe it will heat and burn the kernels; and therefore let them be put into the ground as ſoon as they are preſſed, or elſe lay them thin, or parted with ſtraw.

In caſe your land be poor, and wanting depth, or but indifferent, obſerving the poſture of your ground, divide it into four yards diſtance at both extreams, by ſmall ſtakes, making rows of them, by ſetting up ſome few between them, to direct and lay your work ſtraight, plowing one yard of each ſide of the ſtakes, if the ground be green ſward, for the eaſier running of the roots: Having thus plowed two yards, and left two unplowed through your whole piece, ſome ſhort time before the planting ſeaſon, ſo ſoon as the fall of the leaf begins, dig up the unplowed interſtices, laying one half of the earth on the unplowed pieces, and the other half upon the reſt; and as you do this, plant your prepared ſets about a yard diſtant, with ſtore of ſallow or other cuttings with them, digging that ground which you laid on the plowed part a good ſpade deep, which will make it near a foot thick to plant your ſets in: Thus proceed from one unplowed ground to another, till all of it is planted: Two men on each ſide of the ridges will ſoon diſpatch the work, which ſhould be finiſhed by the latter end of January, which is the beſt time for the ſowing your keys, nuts, and other ſeeds, unleſs the weather be froſty, in which caſe you may a little defer it: And when all is ſowed, cover them a little with the ſhovelings of ſome ditches, pond, or other ſtuff, as an aſſured good way to improve ſuch grounds to conſiderable advantage.

For the planting of Walnuts, Cheſnuts, Cyder-Apples, or any other Foreſt or Fruit-trees, in open fields, Mr. Cook directs how the trian-

Book III. gular form exceeds all the reſt for beauty and advantage, I refer you to his 33d chapter.

An old and judicious planter of woods preſcribes us theſe directions for improving of ſheep-walks, downs, heaths, &c. Suppoſe on every ſuch walk, on which five hundred ſheep might be kept, there were plowed up twenty acres, (plowed pretty deep, that the roots might take hold, and be able to reſiſt the winds) this ſhould be ſowed with Maſt of Oak, Beech, Chats of Aſh, Maple-keys, Sloes, Service-berries, Nuts, Bulace, Haws, and bruiſed Crabs, mingled and ſcattered about the ſides and ends of the ground, near a yard in breadth. On the reſt ſow no Haws, but ſome few Crab-kernels; then begin a ſide, and ſow five yards broad, plowing under the Maſt, &c. very ſhallow; then leave ſix yards in breadth, and ſow and plow five yards more; and ſo from ſide to ſide, remembering to leave a yard and half at the laſt ſide; let the reſt of the head-lands lie till the remainder of the Cloſe be ſown in March with Oats, &c. to preſerve it from hurt of cattle, and poaching the ground: When the ſpring is of two years growth, draw part of it for Quick-ſets; and when the reſt of the trees are of ſix years ſhoot, exhauſt it of more, and leave not above forty of either ſide, each row five yards diſtant, and here and there a Crab-ſtock to graff on, and in the invironing hedge (to be left thick) let the trees ſtand four yards aſunder; which if forty-four were ſpared, will amount to above four thouſand trees. At twenty years end, ſtock up two thouſand of them; lop a thouſand more every ten years, and reſerve the remaining thouſand for timber. Judge what this may be worth in a ſhort time, beſides the graſs, which will grow the firſt ſix or ſeven years, and the benefit of ſhelter for ſheep in ill weather, when they cannot be folded; and the paſture which will be had under the trees, now at eleven yards interval, by reaſon of the ſtocking up thoſe two thouſand we mentioned, excepting the hedges; and if in any of theſe places any conſiderable waters fortune to lie in their bottoms, fowl would abundantly both breed and harbour there. Theſe are admirable directions for park-lands, where ſhelter and food is ſcarce.

Even in the moſt craggy, uneven, cold, and expoſed places, not fit for arable, as in Biſcay, &c. and in our very peaks of Derbyſhire, and other rocky places, Aſhes grow about every village; and we find that Oak, Beech, Elm, and Aſh will proſper in the moſt flinty ſoils. And it is truly from theſe indications, more than from any other whatſoever that a broken

and decaying Farmer is to be diſtinguiſhed from a ſubſtantial Freeholder, the very trees ſpeaking the condition of the Maſter. Let not then the Royal Patrimony bear a Bankrupt's reproach. But to deſcend yet lower:

Had every acre but three or four trees, and as many of fruit in it as would a little adorn the hedge-rows, the improvement would be of fair advantage in a few years; for it is a ſhame that Turnip-planters ſhould demoliſh and undo hedge-rows near London, where the mounds and fences are ſtripped naked, to give ſun to a few miſerable roots, which would thrive altogether as well under them, being ſkilfully pruned and lopped: Our Gardeners will not believe me, but I know it to be true, though Pliny had not affirmed it. As for Elms, ſaith he, their ſhade is ſo gentle and benign, that it nouriſhes whatſoever grows under it; and (lib. xvii. cap. xxii.) it is his opinion of all other trees, (very few excepted) provided their branches be pared away; which being diſcreetly done, improves the timber, as we have already ſhewed.

Indeed, where Elms are planted either about very ſmall crofts or avenues reſerved for paſture, the roots are apt to ſpring up and annoy the graſs: But I ſpeak of the larger field, and even in the former, that part of the root which ſpreads into the field, may (as I have ſhewn) be hindered from infecting it, by cutting away thoſe fibres which run into the field, without any impeachment to the growth of the trees, of which I have ſome whoſe roots are cut off very near the main ſtems at one ſide, thriving almoſt altogether as well as thoſe which have their roots entire.

Now let us calculate a little at adventure, and much within what is both feaſible and very poſſible, and we ſhall find, that four fruit-trees in each acre throughout England, the product ſold but at ſix pence the buſhel, (but where do we now buy them ſo cheap?) will be worth a million yearly. What then may we reaſonably judge of timber, admit but at the growth of four pence per acre yearly, (which is the loweſt that can be eſtimated) amounting to near half a million, if (as it is ſuppoſed) there may be five or ſix and twenty millions of ſquare acres in the kingdom, (beſides fens, highways, rivers, &c. not counted) and without reckoning in the maſt or loppings; which whoſoever ſhall calculate from the annual revenue the *maſt* only of Weſtphalia (a ſmall and wretched country in Germany) does yield to that Prince, will conclude to be no deſpicable improvement.

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In this poor territory, every Farmer does by antient cuſtom plant ſo many Oaks about his farm as may ſuffice to feed his ſwine. To effect this, they have been ſo careful, that when of late years the armies infeſted the poor country, (both Imperialiſts and Proteſtants) the ſingle Biſhoprick of Munſter was able to pay one hundred thouſand crowns per menſem, (which amounts of our money to about 25,000 l. ſterling) beſides the ordinary entertainment of their own Princes and private families. This being incredible to be practiſed in a country ſo extremely barren, I thought fit to mention, either to encourage or reproach us. General Melander was wont to ſay, the good huſbandry of their anceſtors had left them this ſtock *pro ſacra anchorâ*; conſidering how the people were afterwards reduced to live even on their trees, when the ſoldiers had devoured their hogs; redeeming themſelves from great extremities, by the timber which they were at laſt compelled to cut down, and which, had it continued, would have proved the utter deſolation of that whole country.

I have this inſtance from my moſt worthy and honourable friend Sir William Curſius, late his Majeſty's Reſident in Germany, who received this particular from the mouth of Melander himſelf. In like manner, the Princes and Freedoms of *Heſſe*, *Saxony*, *Thuringia*, and divers other places there, make vaſt incomes of their foreſt-fruit (beſides the timber) for ſwine only: So as in a certain wood in *Heſſia* only, twenty thouſand have been fatted, yielding the Prince 30,000 florins.

I ſay then, whoſoever ſhall duly conſider this, will find planting of wood to be no contemptible addition, beſides the paſture much improved, the cooling of fat and heavy cattle, keeping them from injurious motions, diſturbance, and running as they do in ſummer, to find ſhelter from the heat and vexation of flies.

But I have done, and it is now time to get out of the wood, and to recommend this, and all that we have propoſed, to his Moſt Sacred Majeſty, the Honourable Parliament, and to the Lord High Treaſurer, principal Officers, and Commiſſioners of the Royal Navy; that where ſuch improvements may be made, they be ſpeedily and vigorouſly proſecuted; and where any defects appear, they may be duly reformed.

And what if, for this purpoſe, there were yet ſome additional Office conſtituted, which ſhould have a more univerſal inſpection, and the charge of

all the Woods and Foreſts in his Majeſty's Dominions? This might eaſily be performed by Deputies in every County; perſons judicious and ſkilful in Huſbandry, and who might be repaired to for advice and direction: And if ſuch there are at preſent, (as indeed our laws ſeem to provide) that their power be ſufficiently amplified where any thing appears deficient; and as their zeal might be excited by worthy encouragements, ſo might neglects be encountered by a vigilant and induſtrious check. It ſhould belong to their province to ſee that ſuch proportions of timber, &c. were planted and ſet out upon every hundred, or more of acres, as the Honourable Commiſſioners have ſuggeſted; or as might be thought convenient, the quality and nature of the places prudently conſidered. It ſhould be their office alſo to take notice of the growth and decay of woods, and of their fitneſs for publick uſes and ſale, and of all theſe to give advertiſements, that all defect in their ill governing may be ſpeedily remedied; and the ſuperior Officer or Surveyor ſhould be accountable to the Lord Treaſurer, and to the principal Officers of his Majeſty's Navy for the time being. And why might not ſuch a regulation be worthy the eſtabliſhing by ſome Solemn and Publick Act of State, becoming our Glorious Prince, SOVEREIGN OF THE SEAS! and his prudent Senate, the preſent Parliament?

But to ſhew how this Xilotrophiæ Studium for the preſervation of timber was honoured,

We find in Ariſtotle's *Politicks*, the Conſtitution of Extra-urban Magiſtrates to be *Silvarum Cuſtodes*; and ſuch were the *Conſulares Silvæ*, which the Great Cæſar himſelf (even in a time when Italy did abound in timber) inſtituted; and was one of the very firſt things which he did, at the ſettling of that vaſt Empire, after the Civil Wars had exceedingly waſted the country. Suetonius relates it in the Life of Julius; and Peter Crinitus, in his fifth book *De Honeſta Diſciplina*, cap. iii. gives this reaſon for it, *Ut materies*, ſaith he, *non deeſſet, qua videlicet Navigia publica poſſent à præfecturis fabrum, confici.* True it is, that this Office was ſometimes called *Provincia minor*; but for the moſt part annexed and joined to ſome of the greateſt Conſuls themſelves; that facetious Sarcaſm of the Comedian (where Plautus names it *Provincia caudicaria)* referring only to ſome under officers, ſubſervient to the other. And ſuch a charge is at this day extant amongſt the noble Venetians, who have near *Triviſi* (beſides what they nouriſh in other places) a goodly foreſt of Oaks, preſerved as a Jewel, for the only

De collegiis Fabrorum, Centonariorum, & Dendrophororum, Naviculariorum. & Caudicariorum, plurimæ extant Inſcriptiones apud Lipſium in lib. Inſcrip. antiq. quales Bergomerſium Brixianor. Comenſium, Lugdunenſ. Araricorum & Rhodanicor. eorumque corporum, & Collegiorum patronis curatoribus. Vide etiam Hieron. Rubeum, l. i. Hiſt. Ravennat. Item de Dendrophoris Cod. Theodoſ. lib. i. & ii. iiſdem verbis inſcript: Moriſot. Orb. Marit. lib. i. cap. xxiv.

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uſe of the arſenal, called the *Montello*; and this is carefully ſuperviſed by a certain Officer whom they name *il Capitano*. The like have the Genoëzes for the care of the goodly foreſts of *Attonæ*, in the Iſland of Corſica, full of goodly Oaks and other timber; which not only furniſh that ſtate with ſufficient materials to build their own gallies, and other veſſels, but ſo many for ſale to other nations, that ſince the late inſult the French Monarch made upon that glorious city, he has haughtily forbid them to traffick any more with ſtrangers, by ſupplying them as heretofore, to their great detriment and loſs: This timber is of ſuch a grain and quality, as tho' felled in the new moon, it is not at all impaired.

We might, beſides all theſe, inſtance in many other prudent ſtates; not to importune you with the expreſs laws which Ancus Martius, the Nephew of Numa, and other Princes long before Cæſar, did ordain for this very purpoſe; ſince, indeed, the care of ſo publick and honourable an enterprize as is this of planting and improving of woods, is a right Noble and Royal Undertaking; as that of the Foreſt of Dean in particular, were it bravely managed, an Imperial Deſign; and I do pronounce it more worthy of a Prince, who truly conſults his glory in the higheſt intereſt of his ſubjects, than that of gaining battles, or ſubduing a province.

And now after all this, and the directions and encouragements enumerated in this chapter, together with the moſt important concerns of theſe dominions, I liſt not to declare by *whoſe* negligence ſo little effects appear of theſe *improvements*, which might by this time have been made in the Royal Magazine, ever ſince the firſt edition of this Treatiſe *; though the *Officers* then intruſted, and whoſe duty it was, be now no more. I cannot, however, but call to mind how ſeemingly ſolicitous and earneſt the Commiſſioners were I ſhould digeſt and methodize the papers I laid before them on this ſubject, with a zeal becoming Publick Spirits, (as under their hands I have to ſhew) whilſt the putting it in practice to any laudable degree, was ſoon caſt by as a project ſcarce worth the while. I again affirm, that had theſe advantages of foreſt culture been then vigorouſly encouraged and promoted, there had now been of thoſe materials infinite ſtore, even from the very acorn and ſeminary, a competent advance of the moſt uſeful timber for the building of ſhips, (as I think is ſufficiently made out) ſince

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* This takes in a period of forty years, viz. from the firſt appearance of the Silva in 1664, to the publication of the fourth edition in 1704.

his late Majeſty's Reſtoration. The want of timber, and the neceſſity of being ſupplied by foreign countries, if not prevented by better and more induſtrious inſtruments, may prove in a ſhort time a greater miſchief to the publick than the late diminution of the coin. I wiſh I prove no prophet, whilſt I cannot for my life but often think of what the learned *Melanćthon* above an hundred years ſince was wont to ſay (long before thoſe barbarous wars had made theſe devaſtions in Germany) That the time was coming, when the want of *three* things would be the ruin of Europe, *Lignum*, *probam Monetam*, *probos Amicos*; *Timber*, *good Money*, *ſincere Friends*. How far we ſee this prediction already verified, let others judge: And if what I here have touched with ſome reſentment in behalf of the publick and my country, in this ruſtick Diſcourſe, uſing the freedom of a plain Foreſter, ſeems too rude, it is the Perſon I was commanded to put on, and my Plea is ready,

Δρυὸς παρούσης, πᾶς ἀνὴρ ξυλεύεται.

Præſente Quercu, ligna quivis colligit.

For who could have ſpoken leſs upon ſo ample a ſubject? And therefore I hope my zeal for it in theſe Papers will excuſe the prolixity of this digreſſion, and all other the imperfections of my ſervices.

Si canimus Silvas, Silvæ ſunt conſule dignæ.

APPENDIX *to the* NOTES *on the Chapter of the* OAK.

Since theſe ſheets were printed off, I have been favoured with the following curious and intereſting account of the uſes of OAK LEAVES in Hot-houſes.——The idea is quite new, and I entertain a perfect confidence in the whole narrative, it having been communicated to me by Mr. Speechly, Gardener to his Grace the Duke of Portland, by order of his Grace.

The EDITOR.

" ——————— I preſume that the leaves of the Oak abound with the ſame quality as the bark of the tree, therefore the ſooner they are raked up after they fall from the trees, the better, as that quality will naturally decreaſe during the time they are expoſed to the weather. After being raked into heaps they ſhould immediately be carried to ſome place near the Hot-houſes, where they muſt lie to *Couch*. I generally fence them round with Charcoal-hurdles, or any thing elſe to keep them from being

blown about the garden in windy weather. In this place we tread them well, and water them in caſe they happen to have been brought in dry. We make the heap ſix or ſeven feet in thickneſs, covering it over with old matts, or any thing elſe, to prevent the upper leaves from being blown away. In a few days the heap will come to a ſtrong heat. For the firſt year or two that I uſed theſe leaves, I did not continue them in the heap longer than ten days or a fortnight; but in this I diſcovered a conſiderable inconvenience, as they ſettled ſo much when got into the Hot-houſe as ſoon to require a ſupply. Taught by experience, I now let them remain in the heap for five or ſix weeks, by which time they are properly prepared for the Hot-houſes. In getting them into the Pine-pits, if they appear dry, we water them again treading them in layers exceedingly well till the pits are quite full. We then cover the whole with Tan to the thickneſs of two inches, and tread it well till the ſurface become ſmooth and even. On this we place the Pine-pots in the manner they are to ſtand, beginning with the middle row firſt, and filling up the ſpaces between the pots with Tan. In like manner we proceed to the next row till the whole be finiſhed; and this operation is performed in the ſame manner as when Tan *only* is uſed.

" After this the leaves require no farther trouble the whole ſeaſon through, as they will retain a conſtant and regular heat for twelve months without either ſtirring or turning; and if I may form a judgment from their appearance when taken out, (being always entire and perfect) it is probable they would continue their heat through a ſecond year; but as an annual ſupply of leaves is eaſily obtained, ſuch a trial is hardly worth the trouble of making.

" After this the Pines will have no occaſion to be moved but at the ſtated times of their management, viz. at the ſhifting them in their pots, &c. when at each time a little freſh Tan ſhould be added to make up the deficiency ariſing from the ſettling of the beds; but this will be inconſiderable, as the leaves do not ſettle much after their long *Couching*. During the two firſt years of my practice I did not uſe any Tan, but plunged the Pine-pots into the leaves, and juſt covered the ſurface of the beds, when finiſhed, with a little ſaw-duſt, to give it a neatneſs. This method was attended with one inconvenience; for by the caking of the *leaves* they ſhrunk from the ſides of the pots, whereby they became expoſed to the air, and at the ſame time the heat of the beds was permitted to eſcape.

" Many powerful reaſons may be given why Oak leaves (for I have not tried any other kinds) are preferable to Tanners bark.

" Firſt, They always heat regularly; for during the whole time that I have uſed them, which is near ſeven years, I never once knew of their heating with violence; and this is ſo frequently the caſe with Tan, that I affirm, and indeed it is well known to every perſon converſant in the management of the Hot-houſe, that Pines ſuffer more from this one circumſtance, than from all the other accidents put together, Inſects excepted. When this accident happens near the time of their fruiting, the effect is ſoon ſeen in the fruit, which always comes ill ſhaped and exceedingly ſmall. Sometimes there will be little or no fruit at all; therefore Gardeners who make uſe of Tan *only* for their Pines, ſhould be moſt particularly careful to avoid an over-heat at that critical ſeaſon——the time of *ſhewing* fruit.

" Secondly, The heat of Oak leaves is conſtant; whereas Tanners bark generally turns cold in a very ſhort time after its furious heat is gone off. This obliges the Gardener to give the Tan frequent turnings in order to promote its heating. Theſe frequent turnings (not to mention the expence) are attended with the worſt conſequences, for by the continual moving of the pots backwards and forwards, the Pines are expoſed to the extremes of heat and cold, whereby their growth is conſiderably retarded; whereas when leaves are uſed, the Pines will have no occaſion to be moved but at the times of potting, &c.—— The Pines have one particular advantage in this undiſturbed ſituation; their roots grow through the bottoms of the pots and matt amongſt the leaves in a ſurprizing manner. From the vigour of the plants, when in this ſituation, it is highly probable that the leaves, even in this ſtate, afford them an uncommon and agreeable nouriſhment.

" Thirdly, There is a ſaving in point of expence, which is no inconſiderable object in places where Tan cannot be had but from a great diſtance, as is the caſe here, the article of carriage amounting to ten ſhillings for each waggon-load. Indeed, this was the principal reaſon that firſt induced to me to make trial of leaves.

" My laſt ground of preference is the conſideration that decayed Leaves make good manure; whereas rotten Tan is experimentally found to be of no value. I have often tried it both on Sand and Clay, alſo on Wet and Dry lands, and never could diſcover, in any of my experiments, that it deſerved the name of a Manure; whereas decayed Leaves are the richeſt, and, of all others, the moſt ſuitable for a Garden. But this muſt only be underſtood of leaves after they have undergone their fermentation which reduces them to a true vegetable mould, in which we experimentally know that the food of plants is contained——but whether that food be *Oil*, *Mucilage*, or *Salt*, or a combination of all three, I leave to Philoſophers to determine. This black mould is, of all others, the moſt proper to mix with compoſt earth, and I uſe it in general for Pines, and almoſt for every thing that grows in pots. For Flowers it is moſt excellent. The remainder of this vegetable mould may be employed in manuring the quarters of the Kitchen-Garden, for which purpoſe it is highly uſeful.

" Leaves mixed with Dung make excellent Hot-beds——and I find that beds compounded in this manner preſerve their heat much longer than when made entirely with Dung. In both caſes the application of Leaves will be a conſiderable ſaving of Dung, a circumſtance very agreeable, as it will be the means of preventing the conteſts frequently obſerved in large families between the Superintendant of the Gardens and the Directors of the Huſbandry.

Welbeck, Feb. 20, 1776. W. SPEECHLY."

DENDROLOGIA.

BOOK THE FOURTH.

An Hiſtorical Account of the SACREDNESS *and* USE *of* STANDING GROVES.

Book IV.

AND thus have we finiſhed what we eſteemed neceſſary for the direction of planting, and the culture of trees and woods in general; whether for the raiſing of new, or preſervation of the more antient and venerable ſhades, crowning the brows of lofty hills, or furniſhing and adorning the more fruitful and humble plains, groves, and foreſts, ſuch as were never prophaned by the inhumanity of edge-tools: Woods, whoſe original are as unknown as the Arcadians; like the goodly Cedars of Libanus, Pſalm civ. *Arbores Dei*, according to the Hebrew, for ſomething doubtleſs which they noted in the genius of thoſe venerable plants, beſides their mere bulk and ſtature: And, verily, I cannot think to have well acquitted myſelf of this uſeful ſubject, till I ſhall have in ſome ſort vindicated the honour of trees and woods, by ſhewing my reader of what eſtimation they were of old for their divine, as well as civil uſes; or at leaſt refreſhed both him and myſelf with what occurs of hiſtorical and inſtructive amongſt the learned concerning them. And firſt, ſtanding woods and foreſts were not only the original habitations of men, for defence and fortreſſes, but the firſt occaſion of that ſpeech, polity, and ſociety which made them differ from beaſts. This, the Architect Vitruvius * ingeniouſly deſcribes, where he tells us, that the violent percuſſion of one tree againſt another, forced by an impetuous wind, ſetting them on fire, the flame did not ſo much ſurprize and affright the ſalvage foreſters as the warmth, which (after a little gazing at the unuſual accident) they found ſo comfortable: This (ſays he) invited them to approach it nearer, and, as it ſpent and conſumed, by ſigns and barbarbous tones (which in proceſs of time were formed into ſignificant words) to encourage one another to ſupply it with freſh combuſtibles: By this accident the wild people, who before were afraid of one

* Vitruv. l. ii. cap. 1.

BOOK IV. another, and dwelt aſunder, began to find the benefit and ſweetneſs of ſociety, mutual aſſiſtance, and converſation; which they afterwards improved, by building houſes with thoſe trees, and dwelling nearer together. From theſe mean and imperfect beginnings they arrived in time to be authors of the moſt poliſhed arts; they eſtabliſhed laws, peopled nations, planted countries, and laid the foundation of all that order and magnificence which the ſucceeding ages have enjoyed. No more then let us admire the enormous moles and bridges of Caligula acroſs to Baiæ; or that of Trajan over the Danubius (ſtupendous work of ſtone and marble!) to the adverſe ſhores; whilſt our timber and our trees making us bridges to the furtheſt Indies and Antipodes, land us into new worlds. In a word, (and to ſpeak a bold and noble truth) trees and woods have twice ſaved the whole world; firſt by the Ark, then by the Croſs; making full amends for the evil fruit of the tree in Paradiſe, by that which was borne on the tree in Golgotha. But that we may give an account of the ſacred and other uſes of theſe venerable retirements, we will next proceed to deſcribe what thoſe places were.

Though Silva was the more general name, denoting a large tract of wood or trees, the *inciduæ* and *cæduæ*, yet there were ſeveral other titles attributed to greater or leſſer aſſemblies of them: *Domus Silvæ* was a Summer-houſe; and ſuch was Solomon's Οἶκος δρυμοῦ, 1 Reg. vii. 2. When they planted them for pleaſure and ſhade only, they had their *Nemora*; and as we our Parks, for the preſervation of game and particularly veniſon, ſo had they their *Saltus*, and *Silva invia*, ſecluded for the moſt part from the reſt. But among authors we meet with nothing more frequent, and indeed more celebrated, than thoſe arboreous amenities and plantations of woods, which they called *Luci*; and which, tho' ſometimes reſtrained to certain peculiar places for devotion, (which were never to be felled) yet were they alſo promiſcuouſly both uſed, and taken for all that the wide foreſt comprehends, or can ſignify. To diſmiſs a number of critics, the name *Lucus* is derived by Quintilian and others, who delight to play with words, (by antiphraſis) *à minime Lucendo*, becauſe of its denſity *,

——— *nulli penetrabilis aſtro.*

NOTES.

* The learned Mr. Bryant, in his Analyſis of Antient Mythology, has ſomething extremely curious upon the derivation of the word LUCUS. He ſays that the Sun, by the Amonians, was ſtiled El-Uc, which the Grecians changed into Λυκος, Lucos. He was alſo ſtiled El-Uc-Or, which was changed to Λυκωρευς: and El-Uc-Aon, ren-

whence Apuleius uſed *Luco ſublucido*; and the Poets, *Subluſtri umbra*: Others (on the contrary) have taken it for light in the maſculine; *umbra, non quia minime, ſed quia maxime luceat*; by ſo many lamps ſuſpended in them before the ſhrine; or becauſe they kindled fires, by what accident unknown:

——————— ſeu Cœli fulmine miſſo,
Sive quod inter ſe bellum Silveſtria gentes
Hoſtibus intulerant ignem, formidinis ergo.
LUCRET. lib. v.

——————— Whether it were
By lightning ſent from Heaven, or elſe there
The ſalvage men in mutual wars and fight,
Had ſet the trees on fire, their foes t' affright.

Or whether the trees ſet on fire themſelves:

Mutua dum inter ſe rami ſtirpeſque teruntur.
When claſhing boughs thwarting, each other fret.

NOTES.

dered Lycaon, Λυκαων. As this perſonage was the ſame as El-Uc, Λυκος; it was fabled of him that he was turned into a wolf. The cauſe of this abſurd notion aroſe from hence: every ſacred animal in Egypt was diſtinguiſhed by ſome title of the Deity. But the Greeks never conſidered whether the term was to be taken in its primary, or in its ſecondary acceptation; hence they referred the hiſtory to an animal, when it related to the God, from whom the animal was denominated. Λυκος, Lucos, was, as I have ſhewn, the name of the Sun; hence, wherever this term occurs in compoſition, there will be commonly found ſome reference to that Deity, or to his ſubſtitute Apollo. We read of Λυκιε Απολλωνος ιερον: of *Lycorus*, a ſuppoſed ſon of Apollo: of *Lycomedes*, another ſon: of *Lycoſura*, the firſt city which the ſun beheld. The people of Delphi were of old called *Lycorians*; and the ſummit of Parnaſſus, *Lycorea*. Near it was a town of the ſame name; and both were ſacred to the God of Light. From *Lucos*, in in this ſenſe, came lux, luceo, lucidus, and Jupiter Lucetius, of the Latins: and Λυχνος, Λυχνια, Λυχνεω, of the Greeks: alſo Λυκαβας, and αμφιλυκος, though differently expreſſed. Hence it was that many places, ſacred to Apollo, were ſtiled *Leuce*, *Leuca*, Λυκια, *Leucas*, *Leucate*:

Mox et Leucatæ nimboſa cacumina montis,
Et formidatus nautis aperitur Apollo. VIRG.

Hence alſo inſcriptions DEO LEUCANIÆ: which term ſeems to denote SOL-FONS, the Fountain of Day. The name *Lycophron*, Λυκοφρων, which ſome would derive from Λυκος, a Wolf, ſignifies a perſon of an enlightened mind. Groves were held very ſacred: hence LUCUS, which ſome would abſurdly derive a *non lucendo*, was ſo named from the Deity there worſhiped. *Vol.* I. *p.* 79.

BOOK IV.

For ſuch accidents, and even the very heat of the ſun alone has kindled wonderful conflagrations; or haply (and more probably) to conſume their ſacrifices, we will not much inſiſt. The Poets, it ſeems, ſpeaking of Juno, would give it quite another original, and tune it to their ſongs invoking Lucina, whilſt the main and principal difference conſiſted not ſo much in the *Name*, as the *Uſe* and *Dedication*, which was for ſilent, awful, and more ſolemn Religion (*Silva, quaſi ſilens locus*); to which purpoſe they were chiefly *manu conſiti*, ſuch as we have been treating, entire, and never violated with the Ax: Fabius calls them *Sacros ex Vetuſtate*, venerable for their age; and certain it is, they had of very great antiquity been conſecrated to holy uſes, not only by ſuperſtitious perſons to the Gentile Deities and Heroes, but to the true God by the Patriarchs themſelves, who, *ab initio*, (as is preſumed) did frequently retire to ſuch places to ſerve him, compoſe their meditations, and celebrate ſacred myſteries, prayers, and oblations; following the tradition of the Gomerites, or deſcendants of Noah, who firſt peopled Galatia and other parts of the world after the univerſal deluge*. From hence ſome preſume that even the antient Druids had their origin: But that Abraham might imitate what the moſt religious of that age had practiſed before him, may not be unlikely; for we read he ſoon planted himſelf and family at the Quercetum of Mamre, Gen. xiii. where, as Euſebius, Eccleſ. Hiſt. l. i. c. 18.† gives us the account, he ſpread his pavilions, erected an altar, offered and performed all the prieſtly rites; and there, to the immortal glory of the Oak, or rather *Arboreous Temple*, he entertained God himſelf. Iſidore, St. Hierom‡, and Sozomen report confidently, that one of the moſt eminent of thoſe trees remained till the reign of the great Conſtantine, (and the ſtump till St. Hierom) who founded a venerable chapel‖ under it; and that both the Chriſtians, Jews, and Arabs held a ſolemn anniverſary or ſtation there, and believed that from the very time of Noah it had been a conſecrated place. Sure we are, it was about ſome ſuch aſſembly of trees, that God was pleaſed firſt of all to appear to the Father of the Faithful, when he eſtabliſhed the Covenant with him; and more expreſsly, when removing thence (upon confirming the League with Abimelech, Gen. xxi. and ſettling at Beerſheba) he deſigned an expreſs place for God's Divine Service: For *there*, ſays the ſacred text, *he planted a Grove, and called upon the name of the Lord.* Such another tuft we read of, (for we muſt not always reſtrain it to one ſingle tree) when the Patriarch came to אלון מורה, *Elon Moreh, ad Quercetum Moreh*: But whether that were the ſame in which the High-Prieſt repoſited the famous Stone, after the exhortation mentioned, Joſhua xxiv. 26,

* See the learned Pezron Antiq. ſusè.

† Euſeb. l. v. cap. 19. Demonſtr. Evang. ubi de Terebintho. Hieronymus, de locis Hebraicis, &c.

‡ Hieron in Epitaph Paul. vide & Eraſ. Schol in Ep. ad Pammachium.

‖ See the Emperor's Reſcript to Biſh. Macarius, for the demolition of the Idol worſhipped there; and the building of a magnificent church, Euſeb. de vit. Conſtant. l. iii. cap. 50.

we do not contend; *under an Oak*, ſays the Scripture, and it grew near the Sanctuary, and probably might be that which his grandchild conſecrated with the funeral of his beloved Rebecca, Gen. xxxv. For it is apparent, by the context, that *there* God appeared to him again: So Grotius, upon the words, "ſubter Quercum," ſays, *Illam ipſam cujus mentio*, Gen. xxxv. 4. *in hiſtoria Jacobi et Judæ*; and adds, *Is locus in honorem Jacobi diu pro Templo fuit:* "that the very ſpot was long after uſed for a Temple in honour of him." This was the place which *Sozomen* calls *Terebinthum*, from certain trees growing there; theſe, ſays Joſephus, *de Bell. Jud.* l. v. were as antient as the world itſelf. Some report that this Oak ſprung from a ſtaff, which one of the Angels, who appeared to the Patriarch, fixed in the ground: So Geor. Syncellus in Chronico. *Mirum verò eſt* (ſays Valeſius on this paſſage of Euſebius) *cum Quercus ibidem fuerit, ſub qua Abraham Tabernaculum poſuerit, (ut legitur in* Gen. xviii.) *cur locus ipſe à Terebintho potius quam a Quercu nomen acceperit.* In the mean time, as to the prohibition, Deut. xvi. 21, whether this Patriarchal Devotion in Groves, and under Arboreous Shades, was approved by God, till there was a fixed altar, and his ceremonial worſhip confined to the tabernacle and temple, I think needs be no queſtion *.

* D. Doughty Analecta Sacra Excurſ. xiii.

If we therefore now would tract the religious eſteem of trees and woods yet farther in holy writ, we have that glorious viſion of Moſes in the fiery thicket; and it is not to abuſe or violate the text, that Moncæus and others interpret it to have been an entire Grove, and not a ſingle buſh only which he ſaw as burning, yet unconſumed. *Puto ego* (ſays my Author) *rubi vocabulo non quidem rubum aliquem unicum & ſolitarium ſignificari, verum rubetum totum, aut potius fruticetum, quomodo de Quercu Mambre pro Querceto toto docti intelligunt.* Now that they worſhipped in that place ſoon after their coming out of Egypt, the following ſtory ſhews; and the feaſt of tabernacles had ſome reſemblance of patriarchal devotion under trees †, though but in temporary Groves and ſhades in manner of booths, yet celebrated with all the refreſhings of the foreſt; and from the very infancy of the world, in which Adam was entertained in paradiſe, and Abraham (as we noted) received his divine gueſts, not in his tent, but under a tree, an Oak, (*triclinium angelicum*, the angels' dining-room) all intelligent perſons have embraced the ſolace of ſhady arbours, and all devout perſons found how naturally they diſpoſe our ſpirits to religious contemplations. For this, as ſome conceive, they much affected to plant their trees in circles, and gave that capacious form to the firſt temples, obſer-

† Lev. xxxiii. 40.

BOOK IV.

ved not only of old, but even at this day by the Jews, as the moſt accommodate for their aſſemblies; or, as others, becauſe that figure moſt reſembled the univerſe and the heavens: *Templum à templando*, ſays a knowing critic; and another, *Templum eſt neſcio quid immane, atque amplum*; ſuch as Arnobius ſpeaks of, that had no roof but heaven, till that ſumptuous fabric of Solomon was confined to Jeruſalem, and the goodlieſt Cedars and moſt coſtly woods were carried thither to form the columns and lay the rafters; and then, and not till then, was it ſo much as ſchiſm, that I can find, to retire to Groves for their devotion, or even to Beth-el itſelf.

See Tirinus, our Mede, Ainſworth. Diatrib. on Joſh. xxiv. 26. Valeſius Annot. in lib. 2. Hiſt. Eccleſ. Euſeb. p. 28.

In ſuch receſſes were the antient Oratories and Proſeuchæ, built theatre-wiſe, *ſub dio*, at ſome diſtance from the cities, Acts xvi. and made uſe of even amongſt the Gentiles as well as the people of God; (nor is it always the leſs authentical for having been the guiſe of nations); hence that of Philo, ſpeaking of one who πάσας Ιουδαίων προσευχὰς ἐδενδροτόμησε, &c. had felled all the trees about it; and ſuch a place the Satyriſt means where he aſks, *In qua te quæro Proſeucha?* becauſe it was the rendezvous alſo where poor people uſed to frequent, to beg the alms of devout and charitable perſons; ſo as it was eſteemed *piacular* for any to cut down ſo much as a ſtick about them, unleſs it were to build them; when, with the Pſalmiſt, men had honour according to their forwardneſs of repairing the houſes of God in the land; upon which account it was lawful to lift up *axes* againſt the goodlieſt trees in the foreſt. But thoſe zealous days are paſt:

Et nunc deſertis ceſſant ſacraria lucis:
Aurum omnes, victa jam pietate, colunt. PROPERT.

Now temples ſhut, and groves deſerted lie:
All gold adore, and neglect piety.

In the mean time, that which came neareſt to the *Scenopegia* of the Jews, and other ſolemnities, was called by the Romans, *Umbræ*; as thoſe in *Neptunalibus* are deſcribed by the poet:

Plebs venit, ac virides paſſim disjecta per herbas
Potat & accumbit cum pare quiſque ſua:
Sub jove pars durat, pauci tentoria ponunt;
Sunt quibus è ramis frondea facta caſu eſt. OVID. Faſt. lib. iii.

All ſorts together flock; and, on the ground
Diſplay'd, each fellow with his mate drinks round.
Some ſit in open air, ſome build their tents,
And ſome themſelves in branchy arbors fence.

Plutarch, ſpeaking of the anniverſary feaſt of Bacchus, plainly reſembles it to that of thet abernacles, carrying about Θύρσες Φοινικῶν, branches of Palm, Citron, and other trees, as Joſephus deſcribes the Jewiſh Feſtival: The cuſtom (for ought I know) is ſtill kept up in many places of our country, and abroad, on May-Day (and about the time of the year) when the young men and maidens, like the Pagan θύρσοφορίκ, go out into the woods and coppices, cut down and ſpoil young ſpringers, to dreſs up their May-booth, and dance about the *Pole*, as in pictures we ſee the wanton Iſraelites about the *Molten Calf*. For thus, as we noted, thoſe rites commanded by God came to be prophaned, and the retiredneſs of Groves and ſhades for their opacouſneſs, abuſed to abominable purpoſes, and works of darkneſs. But what good or indifferent thing has not been ſubject to perverſion? It is ſaid in the end of Iſaiah, *Exprobatur Hebræis quod in Opiſthonais idolorum horti eſſent in quorum medio februabantur*; but how this is applicable to Groves, does not appear ſo fully; though we find them interdicted, Deut. xvi. 21. Judg. vi. 26. 2 Chron. xxxi. 3, and forbidden to be planted near the temple. And an impure Grove on mount Libanus, dedicated to Venus, was by an imperial edict of Conſtantine extirpated: But from the abuſe of the thing to the non-uſe, the conſequence is not always valid; and we may note as to this very particular, that where in divers places of holy writ the denunciation againſt Groves is ſo expreſs, it is frequently to be taken but *catachreſtically*, from the *Wooden Image* or *Statue* called by that name, as our learned Selden makes out by ſundry inſtances in his *Syntagma de Diis Syris*. Indeed the uſe of Groves upon account of devotion was ſo antient, and ſeemed ſo univerſal, that they conſecrated not only real and natural Groves, but *Lucos pictos*, artificial *Boſcage* and repreſentations of them.

Vid. Seldenum de jure Nat. & Gent. Heb. lib. ii. cap. vi. Lil. &. Gre. Gyraldum de diis gent. Syntag. 17.

Vid. Sanctium, Piſcat. Grotium.

The ſum of all is, Paradiſe itſelf was but a kind of Nemorous Temple, or Sacred Grove, planted by God himſelf, and given to man, *tanquam primo ſacerdoti*; the word is עבד *, which properly ſignifies to ſerve or adminiſter *res divinas*; a place conſecrated for ſober diſcipline, and to contemplate thoſe myſterious and ſacramental trees, which they were not to touch with

* Gen. ii. 15.

BOOK IV. their hands; and in memory of them, I am inclined to believe, holy men (as we have ſhewed in Abraham and others) might plant and cultivate Groves, where they traditionally invoked the Deity; and St. Hierom, Chryſoſtom, Cyprian, Auguſtin, and other Fathers of the church, greatly magnified theſe pious advantages; and Cajetan tells us, that from Iſaac to Jacob, and their deſcendants, they followed Abraham in this cuſtom. Solomon was a greater Planter of them, and had an houſe of pleaſure, or lodge, in one of them for receſs. In ſuch places were the monuments of their ſaints, and the bones of their heroes depoſited; for which David celebrated the humanity of the Galadites, in *Nemora Jabes*, as moſt ſacred and inviolable. In ſuch a place did the Angel appear to Gideon; and in others, Princes were *inaugurated*; ſo Abimelech, Judg. ix. And the Rabbins add a reaſon why they were reputed ſo venerable; becauſe, being more remote from men and company, they were more apt to compoſe the ſoul, and fit it for divine actions *.

Though, ſince the Devil's intruſion into Paradiſe, even the moſt holy and devoted places were not free from his temptations and ugly ſtratagems, yet we find our bleſſed Saviour did frequently retire into the wilderneſs, as Elijah and St. John Baptiſt did before him, and divers other holy men, particularly the Θεωρητικοὶ, whom Philo mentions, a certain religious ſect, who, addicting themſelves to contemplation, choſe the ſolitary receſſes of Groves and Woods; as of old the Rechabites, Eſſenes, primitive Monks, (and other inſtitutions) retired amongſt the Thebaid deſarts; and perhaps the air of ſuch retired places may be aſſiſtant and influential for the inciting of penitential expreſſions and affections, eſpecially where one may have the

Philo lib. περὶ βίου θεορ.

NOTES.

* It is natural for man to feel an awful and religious terror when placed in the centre of a thick wood; on which account, in all ages, ſuch places have been choſen for the celebration of religious ceremonies. "Lucos et ipſa ſilentia adoramus." Seneca ſays, *Si tibi occurrit vetuſtis arboribus, et ſolitam altitudinem egreſſis frequens lucus, et conſpectum Cœli denſitate ramorum aliorum alios protegentium ſubmovens: illa proceritas Sylvæ, et ſecretum loci et admiratio umbræ, in aperto tam denſæ atque continuæ, fidem tibi numinis facit.* Epiſt. xli.

All pale with ſacred horror, they ſurvey'd
The ſolemn mountain and the reverend ſhade.
Some God, the Monarch ſaid, ſome latent God
Dwells in that gloom, and haunts the frowning wood.

PITT'S VIRGIL.

additional aſſiſtances of ſolitary grotts, murmuring ſtreams, and deſolate proſpects. I remember that under a tree was the place of that admirable St. Auguſtin's ſolemn converſion, after all his importunate reluctances. I have often thought of it, and it is a melting paſſage, as himſelf has recorded it, Con. l. viii. c. 8, and he gives the reaſon, *Solitudo enim mihi ad negotium flendi aptior ſuggerebatur.* And that indeed ſuch opportunities were ſucceſsful for recollection, and to the very reformation of ſome ingenuous ſpirits, from ſecular engagements to excellent and mortifying purpoſes, we may find in that wonderful relation of Pontianus's two friends, great Courtiers of the time, as the ſame holy father relates it, previous to his own converſion. And here I cannot omit an obſervation of the learned Dr. Plot, in his (often-cited) Nat. Hiſt. of Oxfordſhire, taking notice of two eminent religious houſes, whoſe foundations were occaſioned by trees; the firſt Oſney-Abbey; the ſecond, by reaſon of a certain tree, ſtanding in the meadows, (where after was built the Abbey) to which a company of Pyes were wont to repair as oft as Editha, the wife of Robert D'Oyly, came to walk that way to ſolace herſelf; for the clamorous birds did ſo affect her, that, conſulting with one Radulphus (Canon of St. Fridiſwid) what it might ſignify, the ſubtle man adviſed her to build a Monaſtery where that tree ſtood, as if ſo directed by the Pyes in a miraculous manner; nor was it long ere the Lady procured her Huſband to do it, and to make Radulphus (her Confeſſor) firſt Prior of it.

Such another foundation was cauſed by a triple Elm having three trunks iſſuing from one root. Near ſuch a tree as this was Sir Thomas White, Lord Mayor of London, warned by a dream to erect a College for the education of youth, which he did, namely, St. John's in Oxford, which, with the very tree, ſtill flouriſhes in that Univerſity. But of theſe enough, and perhaps too much.

We ſhall now, in the next place, endeavour to ſhew how this innocent veneration to Groves paſſed from the people of God to the Gentiles, and by what degrees it degenerated into dangerous ſuperſtitions; for the devil was always God's ape, and did ſo ply his Groves, Altars, and Sacrifices, and almoſt all other rites belonging to his worſhip, that every green tree was full of his abominations, and numerous places were devoted to his impure ſervice: *Hi fuêre* (ſays Pliny, ſpeaking of Groves) *quondam Numinum templa*, &c. "Theſe were of old the temples of the gods; and

Cyril. Alexan. in Hoſ. iv. 13. Deut. xvi. 4. 2 Reg. xvi. 4.

BOOK IV.

Melchior Adamus Hiſt Eccl. de Sueconibus, cap. ccxxxiv.

" (after that ſimple, but antient cuſtom) men at this day conſecrate the " faireſt and goodlieſt trees to ſome deity or other; nor do we more adore " our glittering ſhrines of gold and ivory than the Groves in which, " with a profound and awful ſilence, we worſhip them." Quintilian, ſpeaking of the veneration paid an old umbrageous Oak, adds, *In quibus grandia, & antiqua robora jam non tantum habent ſpeciem, quantùm religionem:* For in truth the very tree itſelf was ſometimes deified, and that

Mariana in 2. Paralip. xxviii. 4.

Celtic ſtatue of Jupiter no better than a prodigious tall Oak, whence, it is ſaid, the Chaldean Theologues derived their ſuperſtition towards it; and the Perſians, we read, uſed that tree in all their myſterious rites. And, as for wood in general, they paid it that veneration for its maintaining their deity, (repreſented by their perennial fire) that they would not ſuffer any ſort of wood to be uſed for coffins to incloſe the dead in, (but wrapt them in plates of iron) counting it a profanation. In ſhort, ſo much were people given up to this deviliſh and unnatural blindneſs, as to offer human ſacrifices, not to the *Tree-gods* only, but to the *Trees* themſelves as real *Gods:*

Omniſque humanis luſtrata cruoribus arbos. LUCAN.

Each tree beſprinkled us with human gore.

Procopius tells us plainly, that the Sclavii worſhipped trees and whole foreſts of them: See Jo. Dubravius, lib. i. Hiſt. Bohem. And that formerly the Gandenſes did the like, Surius, the Legendary, reports in the life of St. Amadus; ſo did the Vandals, ſays Albert Crantz; and even thoſe of Peru, as I learn from Acoſta, lib. v. cap. xi. But one of the firſt idols which procured particular veneration in them, was the Sidonian Aſhteroth, who took her name *à lucis*, as the Jupiter Ἐνδενδρος amongſt the Rhodians, the Nemorenſis Diana or Arduenna, a celebrated Deity of this our iſland, for her patronage of wood and game;

Diva potens memorum, terror ſilveſtribus Apris:

as Gildas, an antient bard of ours, has it; ſo ſoon had men, it ſeems, degenerated into this irrational and ſtupid devotion—that Arch *Fanatic* Satan, who began his pranks in a tree, debauching the contemplative uſe of Groves and other ſolitudes. Nor were the Heathens alone in this crime, the Baſilidians, and other Hereticks even amongſt the Chriſtians, did con-

ſecrate to the woods and the trees their ſerpent-footed and barbarous ΑΒΡΑΞΑΣ, as it is yet to be ſeen in ſome of their myſterious Taliſmans and Periaptas which they carried about.

But the Roman madneſs (like that which the Prophet derides in the Jews) was well perſtringed by Sedulius and others, for imploring theſe ſtocks to be propitious to them, as we learn in Cato de R. R. c. 113. 134. Nor was it long after (when they were generally conſecrated by Faunus) that they boldly ſet up his oracles and reſponſes in theſe nemorous places: Hence the Heathen Chapels had the name of *Fana*, and, from their wild and extravagant religion, the profeſſors of it *Fanaticks*; a name well becoming ſome of the late *Enthuſiaſts* amongſt us, who, when their *quaking* fits poſſeſs them, reſemble the giddy motion of *trees*, whoſe heads are agitated with *every wind of Doctrine*.

Here we may not omit what learned men have obſerved concerning the cuſtom of Prophets, and perſons inſpired of old, to ſleep upon the boughs and branches of trees; I do not mean on the tops of them, (as the Salvages ſomewhere do in the Indies, for fear of wild beaſts in the night-time) but on matraſſes and beds made of their leaves, *ad conſulendum*, to aſk advice of God. Naturaliſts tell us, that the Laurus and Agnus Caſtus were trees which greatly compoſed the fancy, and did facilitate true viſions; and that the firſt was ſpecifically efficacious πρὸς τὰς ἐνθουσιασμούς, (as my Author expreſſes it) to inſpire a poetical fury: Such a tradition there goes of Rebekah the wife of Iſaac, in imitation of her father-in-law: The inſtance is recited out of an antient Eccleſiaſtical Hiſtory by *Abulenſis*: and from hence the Delphic Tripos, the Dodonæan Oracle in Epirus, and others of that nature, had their originals: At this decubation upon boughs the Satyriſt ſeems to hint, where he introduces the Gypſies:

See S. Fulgent. Mythol. cap. xiii. & Munſterum in Comment.

See Hier. in Trad. Heb. 3 Reg. c. iv.

> Arcanam Judæa tremens mendicat in aurem
> Interpres legum Solymarum, & magna Sacerdos
> Arboris, ac ſummi fida internuncia cœli. Juv. Sat. vi.

> ——————————With fear
> A cheating Jeweſs whiſpers in her ear,
> And begs an alms: An High-Prieſt's daughter ſhe,
> Vers'd in their Talmud and Divinity;
> And propheſies beneath a ſhady tree.

BOOK IV.

For indeed the Delphic Oracle (as Diodorus, lib. xvi. tells us) was firſt made *è Lauri ramis*, of the branches of Laurel transferred from Theſſaly, bended and arched over in form of a bower or ſummer-houſe; a very ſimple fabrick you may be ſure: And Cardan, I remember, in his book de Fato, inſiſts very much on the dreams of trees for portents and preſages, and that the uſe of ſome of them do diſpoſe men to viſions.

From hence then began Temples to be erected and ſought to in ſuch places; nay, we find * ſanction for it among the laws of the Twelve Tables; and as there was hardly a Grove without its Temple, ſo almoſt every Temple had a Grove belonging to it, where they placed idols, altars, and lights, endowed with fair revenues, which the devotion of ſuperſtitious perſons continually augmented: Such were thoſe * *arbores obumbratrices*, mentioned by Tertullian, Apol. cap. ix. on which they ſuſpended their Ἀναθήματα and devoted things: And I remember to have ſeen ſomething very like this in Italy, and other parts; namely, where the images of the Bleſſed Virgin, and other ſaints, have been enſhrined in hollow and umbrageous trees, frequented with much veneration; which puts me in mind of what that great traveller Pietro della Valla relates, where, ſpeaking of an extraordinary Cypreſs, yet extant, near the tomb of Cyrus, to which at this day many pilgrimages are made, he mentions a gummy tranſudation which it yields, that the Turks affirm to turn every Friday into drops of blood: The tree is hollow within, adorned with many lamps, and fitted for an Oratory; and indeed ſome would derive the name Lucus, a Grove, as more particularly to ſignify ſuch enormous and cavernous trees, *quod ibi lumina accenderentur religionis cauſa:* But our Author adds, The *Ethnics* do ſtill repute all great trees to be *divine*, and the habitation of *ſouls* departed: Theſe the Perſians call Pir and Imàm. Perhaps ſuch a hollow tree was that Aſylum of our Poet's Hero, when he fled from his burning Troy:

Vide Annium Viterb. lib. xvii. fol. 158. * Cic. de Leg. lib. ii.

* See Ariſtophanes Schol. ad Pluti Verba: κὴ ταῦτα ωρὸς τὸ μέτωπον, &c. —— ὅτι ἐπὶ τῶν κοτινων, κὴ ἄλλων δενδρων πανταχῦ ἐν τοὶς ἱεροῖς προσπατλαλεὺεσι τά ἀναθήματα. To which add, Apul. Miles. VI. Videt dona ſpecioſa, & lacinias auro literatas, ramis arborum poſtibuſque ſuffixas.

——————juxtaq; antiqua Cupreſſus
Religione Patrum multos ſervata per annos. ÆN. ii.

——————an antient Cypreſs near,
Kept by religious parents many a year.

For that they were places of protection, and privileged like churches and altars, appears out of Livy, and other good authority: Thus where they introduce Romulus encouraging his new colony,

———Ut ſaxo Lucum circumdedit alto
Quilibet, huc dicit, confuge, tutus eris.

So ſoon as e'er the Grove he had immur'd,
Haſte hither, ſays he, here you are ſecur'd.

Such a ſanctuary was the *Aricina*, and Suburban *Diana*, called the *Nemorale Templum*, and divers more which we ſhall reckon up anon. Lucian in his Dea Syria, ſpeaks of theſe temples and dedications in their Groves among the Egyptians: *Lucus in urbe fuit*, &c. and what follows? *Hic Templum*—and ſince they could not tranſlate the Grove with the idol, they * carved out ſomething like it, which the ſuperſtitious people bought, carried home, and made uſe of, repreſenting thoſe venerable places, in which they had the images of ſome feigned Deity (ſuppoſe it Tellus, Baal, or Priapus); and ſuch was the Jupiter ἔνδενδρος of the Rhodians, Bacchus of the Boetians, עשתרות the Sidonian Aſhteroth: and the women mentioned 2 Reg. xxiii. 7, who are ſaid to weave hangings and curtains for the Grove, were no other than makers of Tentories to ſpread from tree to tree, for the more opportune and ſecret perpetration of thoſe impure rites and myſteries, which (without theſe coverings) even the opacouſneſs of the places were not obſcure enough to conceal *.

Virg. Eclog. 6. & Æneid. 1. Vide Fab. l. 3. Semeſt. c. 1.

* Luci dicuntur, non modo collectio arborum, &c. ſed etiam ſciagraphiæ ſive delineationes lucorum in tabella: See the Annotation on Iſa. xvii. collated with 2Reg. xxiii. 6. Crit. Sacr. for they brought the Grove out of the temple, and burnt it; which clearly ſhews it was the picture or image of the Grove, and not the trees themſelves.

The famous Druids, or Saronides †, whom the learned Bochart, from Diodorus, proves to be the ſame, derived their Oak-theology, namely, from that ſpreading and gloomy-ſhading tree, probably the Grove at Mambre, Gen. xiii. 2. How their myſteries were celebrated in their woods and forelts, is at large to be found in Cæſar, Pliny, Strabo, Diodorus, Mela, Apuleius, Ammianus, Lucan, Aventinus, and innumerable other writers; where you will ſee that they choſe the Woods and the Groves, not only for all their religious exerciſes, but their courts of juſtice, as the whole inſtitution and diſcipline is recorded by Cæſar, lib. vi. and as he, it ſeems, found it in our country of Britain, from whence it was afterwards tranſlated into Gallia; for he attributes the firſt riſe of it to this

† Canc. lib. i. cap. 42. Selden Jani Angl. fac. cap. 2.

NOTES.

* For proof of the lewdneſs and obſcenity of many of the religious rites of the Heathen, vid. Herodot. Euterp. cap. lxiv. Diodor Sicul. lib. iv. Valer Maxim. lib. ii. cap. vi. Juvenal, Sat. ix. ver. 24. and what Euſebius ſaith of a Grove on mount Libanus, dedicated to Venus, in his Life of Conſtantine, lib. iii. cap. lv. Compare 1 Kings xiv. 23, 24.

Book IV. once happy iſland of Groves and Oaks; and affirms, that the antient Gauls travelled hither for their initiation. To this Tacitus aſſents, 14 Annal. and our moſt learned critics vindicate it, both from the Greeks and French impertinently challenging it: But the very name itſelf, which is purely Celtic, does beſt decide the controverſy: For though Δρῦς be *Quercus*, yet Voſſius ſkilfully proves that the Druids were altogether ſtrangers to the Greeks; but what comes yet nearer to us, *Dru*, *fides* (as one obſerves) begetting our now antiquated *Trou* or *True*, makes our title the ſtronger: Add to this, that amongſt the Germans it ſignified no leſs than God himſelf; and we find *Drutin* or *Trudin* to import *Divine*, or *Faithful*, in the *Othfridian Goſpel*, both of them *Sacerdotal* expreſſions. But that in this iſland of ours, men ſhould be ſo extremely devoted to trees, and eſpecially to the Oak, the ſtrength and defence of all our enjoyments, invironed as we are by the ſeas, and martial neighbours, is leſs to be wondered.

Non igitur Dryadæ noſtrates pectore vano
Nec ſine conſulto coluerunt Numine Quercum;
Non illam Albionis jam tum celebravit honore
Stulta ſuperſtitio, venturive inſcia ſæcli
Angliaci ingentes puto prævidiſſe triumphos
Roboris, imperiumque maris, quod maximus olim
Carolides vaſtâ Victor ditione teneret.

Coulei lib. vi. Pl.

Our Britiſh Druids, not with vain intent,
Or without Providence, did the Oak frequent;
That Albion did that Tree ſo much advance
Nor ſuperſtition was, nor ignorance.
Thoſe Prieſts divining even then, beſpoke
The mighty triumphs of the Royal Oak:
When the ſea's empire with like boundleſs fame,
Victorious Charles, the ſon of Charles, ſhall claim.

as we may find the prediction glorioufly followed by our ingenious Poet, where his Dryad conſigns that ſacred Depoſitum to this Monarch of the Foreſt, the Oak, than which nothing can be more ſublime and rapturous; whilſt we muſt never forget that wonderful Providence which ſaved this

forlorn and perſecuted Prince, after his defeat at Worceſter, under the Book IV.
ſhelter of this auſpicious and hoſpitable tree alone; when

——— All the countries fill'd
With enemies troops in every houſe and Grove,
His ſacred head is at a value held,
They ſeek, and near, now very near they move.

What ſhould they do? They from the danger take
Raſh, haſty counſel; yet, from heav'n inſpir'd,
A ſpacious Oak he did his Palace make,
And ſafely in its hollow womb retir'd.

The loyal Tree its willing boughs inclin'd,
Well to receive the climbing Royal Gueſt,
(In Trees more pity than in Men we find)
And its thick leaves into an arbour preſs'd.

A rugged Seat of Wood became a Throne,
Th' obſequious Boughs his Canopy of State:
With bowing Tops the Tree their King did own,
And ſilently ador'd him as he ſate.

But to return to the ſuperſtitions we were ſpeaking of. They were utterly aboliſhed under the reign of Claudius, as appears by Suetonius; and yet, by Tacitus, they continued here in Britain till Nero; and in Gaul till Vitellius, as is found by St. Gregory writing to Q. Brunehant, about the prohibiting the Sacrifices and Worſhip which they paid to Trees, which, Sir James Ware affirms, continued in Ireland till Chriſtianity came in.

From theſe Silvan Philoſophers and Divines (not to ſpeak much of the Indian Brachmans, or antient Gymnoſophiſts) it is believed that the great Pythagoras might inſtitute his ſilent Monaſtery; and we read that Plato entertained his Auditors amongſt his Walks of Trees, which were afterward defaced by the inhumanity of Sylla; when, as Appian tells us, he cut down thoſe venerable ſhades to build forts againſt Pyræus. Another we find he had planted near Anicerides with his own hands, wherein grew that celebrated Platanus, under which he introduces his maſter Socrates diſcourſing

BOOK IV. with Phædon de Pulchro. Such another place was the Athenian Cephiſia, as A. Gellius deſcribes it. We have already mentioned the ſtately Xyſta, with their ſhades, in book ii. c. iv. Democritus alſo taught in a Grove, as we find in that of Hippocrates to Damagetus, where there is a particular tree deſigned *ad otium literarum*; and I remember Tertullian calls theſe places *Studia opaca*. Under ſuch ſhades and walks was at firſt the famous ACADEMIA, ſo venerable, as it was eſteemed by the old Philoſophers prophane ſo much as to laugh in it. See Laertius, Ælian, &c. I could here tell you of Palæmon, Timon, Apollonius, Theophraſtus, and many more that erected their ſchools in ſuch Colleges of Trees, but I ſpare my reader; I ſhall only note, that it is reported of Thucydides that he compiled his noble Hiſtory in the Scaplan Groves, as Pliny writes; and in that matchleſs piece *de Oratore*, we ſhall find the Interlocutors to be often under the Platanus in his Tuſculan Villa, where, invited by the freſhneſs and ſweetneſs of the place, *Admonuit* (ſays one of them) *me hæc tua Platanus quæ non minus ad opacandum hunc locum patulis eſt diffuſa ramis, quam illa, cujus umbram ſecutus eſt Socrates, quæ mihi videtur non tam ipſa aquila, quæ deſcribitur, quàm Platonis oratione creviſſe, &c.* as the Orator brings it in, in the perſon of one of that meeting.

* See this moſt elegantly diſcuſſed in a Greek Epiſtle of Budæus to his brother.

I confeſs Quintilian ſeems much to queſtion whether ſuch places do not rather perturb and diſtract from an Orator's * recollection and the depths of contemplation: *Non tamen* (ſays he) *protinus audiendi, qui credunt aptiſſima in hoc nemora, ſilvaſque, quod illa cæli libertas, locorumque amænitas, ſublimem animum, & beatiorem ſpiritum parent: Mihi certè jucundus hic magis, quam ſtudiorum hortator videtur eſſe ſeceſſus: Namq; illa ipſa quæ delectant, neceſſe eſt avocent ab intentione operis deſtinati:* He proceeds——*Quare Silvarum amænitas, & præter labentia flumina, & inſpirantes ramis arborum auræ, volucrumque cantus & ipſa latè circumſpiſciendi libertas, ad ſe trahunt; ut mihi remittere potius voluptas iſta videatur cogitationem, quam intendere.* But this is only his ſingular ſuffrage, which, as conſcious of his error, we ſoon hear him retract, when he is by and by as loud in their praiſes, as the places in the world the beſt fitted for the diviner rhetoric of Poetry: But let us admit another † to caſt in his ſymbol for Groves: *Nemora* (ſays he) *& luci, & ſecretum ipſum, tantam mihi afferunt voluptatem, ut inter præcipuos carminum fructus numerem, quod nec in ſtrepitu, nec ſedente ante oſtium litigatore, nec inter ſordes & lacrymas reorum componuntur: Sed ſecedit animus in loca pura, atque innocentia, fruiturque ſedibus ſacris.*

† Tacitus.

Whether this were the effect of the incomparable younger Pliny's Epiſtle to this noble Hiſtorian, I know not; but to ſhew him, by his own example, how ſtudy and foreſt-ſport may conſiſt together, he tells him how little the noiſe of the *Chaſers* and bawling *Dogs* diſturbed him, when at any time he indulged himſelf that healthful diverſion: So far was he from being idle, and loſing time, that beſide his *Javelin* and *Hunting-Pole*, he never omitted to carry his *Style* and *Table-Book* with him, that upon any intermiſſion, whilſt he now and then ſat by the toil and nets, he might be ready to note down any noble thought, which might otherwiſe eſcape him: The very motions (ſays he) and agitation of the body in the wood and ſolitude, *magna cogitationis incitamenta ſunt:* I know, my friend (continues he) you will ſmile at it, however take my counſel; be ſure never to carry your Bottle and Biſque into the field, without your Style and Tablet; you will find as well Minerva as Diana in the woods and mountains.

Plin. Ep. vi. lib. 1. Cornelio Tacito.

And indeed the Poets thought of no other heaven upon earth, or elſewhere; for when Anchiſes was ſetting forth the felicity of the other life to his ſon, the moſt lively deſcription he could make of it was to tell him,

——Lucis habitamus opacis.

——We dwell in ſhady Groves.

And when Æneas had travelled far to find thoſe happy abodes,

Devenere locos lætos, & amœna vireta
Fortunatorum nemorum, ſedeſque beatas.

They came to Groves, of happy ſouls the reſt,
To Evergreens, the dwellings of the bleſt.

Such a proſpect has Virgil given us of his Elyſium; and therefore wiſe and great perſons had always theſe ſweet opportunities of receſs, their *Domos Silvæ*, as we read, 2 Reg. vii. 2, which were thence called Houſes of Royal Refreſhment; or, as the Septuagint, Οἴκους δρυμοῦ, not much unlike the Lodges in divers of our Noblemen's Parks and Foreſt-walks; which minds me of his choice in another Poem:

BOOK IV.

——— Pallas quas condidit arces,
Ipſa colat, nobis placeant ante omnia Silvæ. ECLOG. ii.

In lofty towers let Pallas take her reſt,
Whilſt ſhady Groves 'bove all things pleaſe us beſt.

And for the ſame reaſon Mæcenas

Maluit umbroſam Quercum ———

——— Choſe the broad Oak ———

And as Horace beſpeaks them,

——— Me gelidum nemus
Nympharumq; leves cum Satyris Chori,
Secernunt populo ———

Me the cool woods above the reſt advance,
Where the rough Satyrs with the light Nymphs dance.

And Virgil again,

Noſtra nec erubuit Silvas habitare Thalia.

Our ſweet Thalia loves, nor does ſhe ſcorn
To hunt umbrageous Groves ———

Or as thus expreſſed by Petrarch,

Silva placet Muſis, urbs eſt inimica Poetis.

——— The Muſe herſelf enjoys
Beſt in the woods; Verſe flies the city noiſe.

So true is that of yet as noble a Poet of our own;

As well might Corn as Verſe in cities grow:
In vain the thankleſs glebe we plow and ſow:
Againſt th' unnatural ſoil in vain we ſtrive:
'Tis not a ground in which theſe plants will thrive. COWLEY.

When it ſeems they will bear nothing but Nettles and Thorns of Satire, and, as Juvenal ſays, by *Indignation* too; and therefore almoſt all the Poets, except thoſe who were not able to eat bread without the bounty of great men; that is, without what they could get by flattering them, (which was Homer and Pindar's caſe) have not only withdrawn themſelves from the vices and vanities of the great world, into the innocent felicities of Gardens and Groves, and Retiredneſs, but have alſo commended and adorned nothing ſo much in their never-dying Poems *. Here then is the true Parnaſſus, Caſtalia, and the Muſes; and at every call in a Grove of venerable Oaks, methinks I hear the anſwer of an hundred old Druids, and the Bards of our inſpired anceſtors.

* Juvenal Sat. Perſ. Sat.

In a word, ſo charmed were Poets with thoſe natural ſhades, eſpecially that of the Platanus, that they honoured temples with the names of Groves†, though they had not a tree about them. Nay, ſometimes one ſtately tree alone was ſo revered: And of ſuch a one there is mention in a fragment of an inſcription in a garden at Rome, where there was a temple built under a ſpreading Beech tree, ſacred to Jupiter, under the name of *Fagutalis*.

† Ἄλση καλοῦντες τὰ ἱερὰ πάντα, καὶ ἢ ψῖλα, οἱ ποιηταὶ κοσμοῦσιν. Strab. lib. ix.

Innumerable are the teſtimonies I might produce in behalf of Groves and Woods out of the Poets, Virgil, Gratius, Ovid, Horace, Claudian, Statius, Silius, and others of later times, eſpecially the divine Petrarch, (for *ſcriptorum chorus omnis amat nemus*) were I minded to ſwell this charming ſubject beyond the limits of a chapter. I think only to take notice, that theatrical repreſentations, ſuch as were thoſe of the Ionian, called Andria; the ſcenes of paſtorals, and the like innocent rural entertainments, were of old adorned and trimmed up *è ramis & frondibus, cum racemis & corymbis*, and frequently repreſented in Groves, as the learned Scaliger ſhews. Here the moſt beloved and coy miſtreſs of Apollo rooted; and, in the walks and ſhades of trees *, the nobleſt raptures have been conceived, and poets have compoſed verſes which have animated men to heroic and glorious actions: Here Orators (as we ſhewed) have made their panegyricks, Hiſtorians grave relations, and the profound Philoſophers have loved here to paſs their lives in repoſe and contemplation; and the frugal repaſts——*molleſque ſub arbore ſomni*, were the natural and chaſte delights of our forefathers, ſo ſweetly deſcribed by Papinius:

Poetices, lib. i. cap. 21.

* See Wower. de Umbra, cap. xxvi. Biſciola Horæ ſubciſ. cap. 9.

Subter opaca quies vacuuſque ſilentia ſervat
Horror, & excluſæ pallet mala lucis imago

Nec caret umbra Deo———————
Arboribus ſuus horror ineſt, quin ipſe ſacerdos
Acceſſus, Dominumque timet deprehendere luci.

Nor were the Groves thus frequented by the great Scholars and the great Wits only, but by the greateſt Stateſmen and Politicians alſo. Thence that of Cicero ſpeaking of Plato, with Clinias and Megillus, who were uſed to diſcourſe *de Rerumpublicarum inſtitutis, & optimis legibus*, in the Groves of Cypreſs, and other umbrageous receſſes. It was under a vaſt Oak, growing in the park of St. Vincent's, near Paris, that St. Lovis was uſed to hear complaints, determine cauſes, and do juſtice to ſuch as reſorted thither: And we read of a ſolemn treaty of peace held under a flouriſhing Elm between Giſors and Trier, which was afterwards felled by the French King Philip in a rage againſt King Henry II. for not agreeing to it. Nay, they have ſometimes been known to crown their Kings under a goodly Tree, or in ſome venerable Grove, where they had their ſtations and conventions; for ſo they choſe Abimelech. See Toſtatus upon Judg. ix. 6. I read (in Chronicon Jo. Bromton) that Auguſtin the Monk (ſent hither from the Pope) held a kind of council under a certain Oak in the Weſt of England, and that concerning the great queſtion, namely the right celebration of Eaſter, and the ſtate of the Anglican Church, &c. where alſo it is reported he did a great miracle. In the mean time I meet with but one inſtance where this goodly tree has been (in our country) abuſed to cover impious deſigns, as was that of the Arch-Rebel Kett, who, in the reign of Edward VI. (becoming leader to that fanatic inſurrection in Norfolk) made an Oak (under the ſpecious name of * Reformation) the court, council-houſe, and place of convention, whence he ſet forth his traitorous edicts: The hiſtory and event of which, to the deſtruction of the Rebel and his followers, together with the ſermon (call it ſpeech, or what you pleaſe) which our then young Matthew Parker (afterward the venerable and learned Archbiſhop of Canterbury) boldly pronounced on it, to reduce them to obedience, is moſt elegantly deſcribed in Latin, and in a ſtile little inferior to the antients, by our countryman Alexander Nevyll, in his KETTUS: *Sive de furoribus Norfolcienſium* KETTO *Duce*. But to return: The Athenians were wont to conſult of their graveſt matters and public concernments in Groves. Famous for theſe aſſemblies were the Ceraunian, and at Rome the Lucus Petilinus, the Farentinus, and others, in which there was held that renowned parliament after the defeat of the Gauls by M. Popilius; for it was ſuppoſed

* Quercus Reformationis.

that in places ſo ſacred they would faithfully and religiouſly obſerve what was concluded amongſt them:

In ſuch green palaces the firſt kings reign'd,
Slept in their ſhades, and angels entertain'd:
With ſuch old counſellors they did adviſe,
And by frequenting ſacred Groves grew wiſe.
Free from th' impediments of light and noiſe,
Man thus retir'd, his nobler thoughts employs. WALLER.

as our excellent poet has deſcribed it. And, amongſt other weighty matters, they treated of matches for their children, and the young people made love in the cooler ſhades, and engraved their miſtreſſes names upon the bark: *Tituli æreis literis inſculpti*, as Pliny ſpeaks of that antient Vatican Ilex; and Euripides in Hippolyto, where he ſhews us how they made the inciſion whiſper their ſoft complaints, like that of Ariſtænetus, Τοῖχ δὲ ἐιθε ὦ δένδρα, &c. and wiſh that it had but a ſoul and voice to tell Cydippe, the fair Cydippe, how ſhe was beloved: And doubtleſs this character was antienter than that on paper. Let us hear the amorous Poet leaving his young couple thus courting each other:

Lib. xvi. cap. 44. Ariſt. lib. ep. 10.

Inciſæ ſervant à te mea nomina fagi,
Et legor, Oenone, falce notata tuâ.
Et quantum trunci, tantum mea nomina creſcunt:
Creſcite, & in titulos ſurgite recta meos. OVID. Ep.

Each Beech my name yet bears, carv'd out by thee,
Paris and his Oenone fill each tree;
And as they grew the letters larger ſpread,
Grow ſtill a witneſs of my wrongs when dead!

Which doubtleſs he learnt of Maro, deſcribing the unfortunate Gallus:

———Teneriſque meos incidere amores
Arboribus: Creſcent illæ, creſcetis amores. ECLOG. X.

There on the tender bark to carve my love;
And as they grow ſo may my hopes improve

BOOK IV. And theſe pretty monuments of courtſhip, I find, were much uſed on the Cherry tree, (the wild one I ſuppoſe) which has a very ſmooth rind, as the witty Calphurnius:

Dic age, nam Ceraſi tua cortice verba notabo;
Et deciſa feram rutilanti carmina libro.

Repeat, thy words on Cherry bark I'll take,
And that red ſkin my table-book will make.

Let us add the ſweet Propertius:

Ah quoties teneras reſonant mea verba ſub umbras,
Scribitur & veſtris Cynthia Corticibus. *Eleg.* xviii.

* Theocrit. Epithal. Helenæ Idyll. 18.

And ſo deep were the inciſions made, as that of Helena * on the Platan, (ὡς παρίων τὶς αναγνοίη) that one might run and read them. And thus forſaken Lovers appeal to Pines, Beeches, and other trees of the foreſt. But we have dwelt too long on theſe trifles, omitting alſo what we might relate of feaſting, banquetting, and other ſplendid entertainments under trees, nay, ſometimes in the very bodies of them. But we will now change the ſcene, as the Egyptians did the mirth of their gueſts, when they ſerved in a ſcull to make them more ſerious: For thus,

Amongſt other uſes of Groves, I read that ſome nations were wont to hang, not malefactors only, but their departed friends, and thoſe whom they moſt eſteemed, upon trees, as ſo much nearer to Heaven, and dedicated to God, believing it far more honourable than to be buried in the earth. And that ſome affected to repoſe rather in theſe woody places, Propertius ſeems to beſpeak:

Dî faciant mea ne terrâ locet oſſa frequenti
Quâ facit aſſiduo tramite vulgus iter;
Poſt mortem tumuli ſic infamantur amantum,
Me tegat arboreâ devia terra comâ.

The Gods forbid my bones in the high road
Should lie, by every wand'ring vulgar trod.
Thus buried lovers are to ſcorn expos'd;
My tomb in ſome by-arbor be inclos'd.

The ſame is affirmed of other ſeptentrional people by Chr. Cilicus de Bello Dithmarſico, lib. i. It was upon the trunk of a knotty and ſturdy Oak the antient heroes were wont to hang the arms and weapons taken from the enemy, as trophies; as appears in the yet remaining ſtump of Marius at Rome, and the reverſes of ſeveral medals. Famous for this was the pregnant Oleaſter which grew in the Forum of Megara, on which the Heroes of old left their ſhields and bucklers, and other warlike harneſs, till in proceſs of time it had covered them with ſucceſſive coats of bark and timber, as it was afterwards found when Pericles ſacked the city, which the Oracle predicted ſhould be impregnable, till a tree ſhould bring forth armour*. We have already mentioned Rebekah, and read of Kings themſelves that honoured ſuch places with their ſepulchres: What elſe ſhould be the meaning of 1 Chron. x. 12, when the valiant men of Jabeſh interred the bones of Saul and Jonathan under the Oak? Famous was the Hyrnethian Cœmetry where Diaphon lay. Ariadne's tomb was in the Amathuſian Grove in Crete, now Candy; for they believed that the ſpirits and ghoſts of men delighted to expatiate and appear in ſuch ſolemn places, as the learned Grotius notes from Theophylact, ſpeaking of the Dæmons, upon Matth. viii. 20; for which cauſe Plato gave permiſſion, that trees ſhould be planted over graves, to obumbrate and refreſh them. The moſt antient *Conditoria* and burying places were in ſuch nemorous ſolitudes. The Hypogeum in Macpela, purchaſed by the patriarch Abraham of the ſons of Heth, Gen. xxiii. for Sarah, his own dormitory, and family ſepulchre, was conveyed to him with particular mention of all the Trees and Groves about it; and this is the very firſt precedent I ever read of conveying a Purchaſe by a formal Deed.

* Diod. Sic. lib. xii.

Our bleſſed Saviour, as we ſhall ſhew, choſe the garden ſometimes for his Oratory—and dying, for the place of his Sepulchre; and we do avouch for many weighty cauſes, that there are no places more fit to bury our dead in than our gardens and groves, or airy fields, *ſub dio*, where our beds may be decked and carpeted with verdant and fragrant flowers, trees, and perennial plants, the moſt natural and inſtructive hieroglyphics of our expected reſurrection and immortality; beſides what they might conduce to the meditation of the living, and the taking off our cogitations from dwelling too intently upon more vain and ſenſual objects; that cuſtom of burying in churches, and near about them, (eſpecially in great and populous cities) being a novel preſumption, indecent, ſordid, and very prejudicial to health; for which I am ſorry it is become ſo cuſtomary.

BOOK IV.

Graves and ſepulchres were of old made and erected by the ſides of the moſt frequented highways, which being many of them magnificent Structures and Mauſoleums, adorned with ſtatues and inſcriptions, (planted about with Cypreſs and other Evergreens, and kept in repair) were not only graceful, but a noble and uſeful entertainment to the travellers, putting them in mind of the virtues and glorious actions of the perſons buried; of which, I think, my Lord Verulam has ſomewhere ſpoken. However, there was certainly no permiſſion for any to be buried within the walls of Rome, almoſt from the very foundation of it; for ſo was the Sanction, Tab. XII. IN URBE NE SEPELITO NEVE URITO, neither to bury or burn the dead in the city. And when long after they began to violate that law, Antoninus Pius, and the Emperor ſucceeding, did again prohibit it. All we meet of antient to the contrary, is of Ceſtius the Epulos Tomb, which is a thick clumſy pyramid yet ſtanding, *nec in urbe, nec in orbe,* as it were, but half *in*, and half *without* the wall. If then it were counted a thing ſo profane to bury in the cities, much leſs would they have permitted it in their temples; nor was it in uſe among Chriſtians, who, in the primitive ages, had no particular Cæmeteria; but when (not long after) it was indulged, it was to Martyrs only *ad limina*, and in the porches, even to the depoſita of the Apoſtles* themſelves. Princes indeed, and other illuſtrious perſons, founders of churches, &c. had ſometimes their Dormitories near the Baſilicæ and Cathedrals, a little before St. Auguſtin's time, as appears by his book *de cura pro mortuis*, and the conceſſion was not eaſily obtained. Conſtantine, ſon to the Great Conſtantine himſelf, did not, without leave, inhume his Royal Father in the church porch of that auguſt fabrick, though built by that famous Emperor: And yet after this, other great perſons placed their ſepulchres no nearer than towards the church walls, whilſt in the body of the church, they preſumed no farther for a long time after, as may be proved from the Capitula of Charlemagne; nor hardly in the city, till the time of Gregory the Great: and when connived at, it was complained of. We find it forbidden (as to churches) by the Emperors Gratian, Valentinian, and Theodoſius; and ſo in the Code, where the Sanction runs thus: *Nemo Apoſtolorum vel Martyrum ſedem humanis corporibus exiſtimet eſſe* † *conceſſam*, &c. And now, after all this, would it not raiſe our indignation to ſuffer ſo many extortioners, luxurious, profane, and very mean perſons, without merit, not only affecting, but permitted to lay their carcaſſes, not in the nave and body of the church only, but in the very chancel, next the communion table, ripping up the pavements, removing the ſeats, &c. for

* See that paſſage of the famous Civilian Baldwin, ad leg. xii. Tab.

Chryſ. Hom. xxvi. Epiſt. ad Corinth.

† Gretzer. lib. ii. de Fun. Chriſt. cap. 8. Onuphr. de Ritu Sepul.

ſome little gratification of thoſe who ſhould have more reſpect to decency at leaſt, if for no other. BOOK IV.

The fields, the mountains, the highway-ſides, and gardens, were thought enough honourable for thoſe funeral purpoſes: Abraham and the Patriarchs (as we have ſhewed) had their Caves and Crypta in the fields, ſet about with trees: The kings of Judah, their ſepulchres in their palaces, not the ſanctuary and temple: And our moſt bleſſed Saviour's was in a garden; which indeed ſeems to me to be the moſt proper and eligible, as we have already ſhewed; nor even to this day do the Greeks and Eaſtern Chriſtians bury in churches, as is well known. A remarkable inſtance appoſite to this, we have of a worthy perſon of our own country, Mr. Burton, great grandfather of the learned Author who writ the Commentary on Antoninus's Itinerary; which, for its laudable ſingularity, I preſent my reader the deſcription of.

In agro Salopienſi Longnoræ ad Sabrinam, Fl. *ad piſcinas in horto juxta ædes patruelis mei Franciſci Burtoni, proavi mei Epitaphium.*

1558.

* Quod ſcelus? an Chriſti nomen temerare quòd auſus,
Hinc vetitum ſacro condere membra ſolo? —
Dî melius — ſincera fides, nec tramite veri
Devia, cauſa, illo tempore, grande nefas,
Urbibus inſultat noſtris dum turbida ROMA;
Raſaque gens ſacris dat ſua jura locis;
Nec ſacri ritus, nec honores funeris, intra
Mœnia, Chriſticolis, heu male ſancta! piis. —
At referens Domini inculpatæ munera vitæ,
Ad Domini Exemplar funera nactus erat,
Ille ut odorifero tumulatus marmore in horto,
Oſſa etiam redolens hortus & hujus habet;
Hic ubi et expectat, fælix! reſonantia verba
" Ergo age! Mercedem jam, bone ſerve, cape."

NOTES.

* His great grandſon has recorded his death, which was very remarkable: " Having been under perſecution for his religion in the days of Queen Mary, and obliged to live very retired in order to eſcape from her fury, ſitting one day in his upper parlour at Longnor, he heard all the bells in Shrewſbury ring; his right-divining ſoul ſtrait told him that it was for the death of Queen Mary; he enquired, and having learned that it

BOOK IV. Thus, with the incomparable Sannazarius, *Non mihi fornicibus Pariis.*—— Sculptures and Titles preferable to the proudeſt *Mauſoleums* I ſhould chooſe.

The late elegant and accompliſhed Sir W. Temple, though he laid not his whole body in his garden, depoſited the better part of it, his heart, there; and if my executors will gratify me in what I have deſired, I wiſh my corpſe may be interred as I have beſpoke them; not at all out of ſingularity, or for want of a Dormitory, (of which there is an ample one annexed to the pariſh church) but for other reaſons, not here neceſſary to trouble the reader with, what I have ſaid in general being ſufficient: However, let them order it as they think fit, ſo it be not in the church or chancel.

Plato, as we noted, permitted trees to be planted over ſepulchres, to obumbrate the departed; but with better reaſon we adorn their groves with flowers and redolent plants, juſt emblems of the life of man, which has been compared in Holy Scripture to thoſe fading beauties, whoſe roots being buried in diſhonour, riſe again in glory. Of ſuch hortulan inſtances, Gruter gives us this inſcription:

Gruteri Corpus, p. 636, 12.

V. F.
T. VETTIUS. T. L
HERMES
SEPLASIARIUS
MATER. GENUIT. MATER. RECEPIT
HI. HORTI. ITA. UTI. OPT. MAXIMIQ. SUNT
CINERIBUS. SERVIANT. MEIS
NAM. CURATORES. SUBSTITUAM
QUI. VESCANTUR
EX. HORUM. HORTORUM. REDITU
NATALI. MEO
ET. PRAEBEANT. ROSAM. IN. PERPETUUM
HOS. NEQUE. DIVIDI
NEQUE. ALIENARI. VOLO

NOTES.

was certainly ſo, through the exceſs of the joy which he conceived, inſtantly expired." The Epitaph was written by Sir Andrew Corbet, A. D. 1614, in Engliſh, whence Mr. Burton, the Commentator on Antoninus, turned it into the Latin exhibited by Mr. Evelyn.—Elizabeth had not yet had time to open the conſecrated ground for the reception of Proteſtants.

This ſweet flower, borne on a branch full ſet with Thorns, and accompanied with the Lily, are natural hieroglyphics of our fugitive, umbratile, anxious, and tranſitory life, which making ſo fair a ſhew for a time, is not yet without its thorns and croſſes.

Of this kind, and the like antiquity, we could multiply inſtances; nor is the cuſtom yet altogether extinct in my own native county of Surry, and near my dwelling, where the Maidens yearly plant and deck the graves of their defunct Sweethearts with Roſe-buſhes; of which I have given account in the learned Mr. Gibſon's Edition of Camden; and for the reſt, ſee Mr. Sumner of Garden-Burial, and the learned Dr. Cave's Primitive Chriſtianity.

And now let not what I have ſaid, concerning the pious Dr. Hammond's Paraphraſe in the Text, of Hortulan Burial, be thought foreign to my ſubject, ſince it takes in the cuſtom of it in the Groves, and ſhady and ſolemn places, as I have already ſhewed: And thus the Yew, planted in our country church-yards, the Cypreſs, growing ſo like a ſhroud as does that ſepulchral tree, and other perennial greens, emblems of immortality, and a flouriſhing ſtate to come, were not leſs proper to ſhade our natural bed, would our climate ſuffer it.

Let us return then to Groves, and for diverſion add a ſhort recital of the moſt famous Groves which we find celebrated in hiſtories; ſince thoſe, beſides many already mentioned, were ſuch as, being conſecrated both to Gods and Men, bore their names. Amongſt theſe are reckoned ſuch as were ſacred to Minerva, Iſis, Latona, Cybele, Oſiris, Æſculapius, Diana, and eſpecially the Aricinian, in which there was a goodly temple erected, placed in the midſt of an iſland, with a vaſt lake about it, a mount and a Grotto adorned with ſtatues, and irrigated with plentiful ſtreams: And this was that renowned receſs of Numa, where he ſo frequently converſed with his *Ægeria*, as did Minos in the cave of Jupiter; and by whoſe pretended inſpirations they gained the deceived people, and made them receive what laws they pleaſed to impoſe upon them. To theſe we may join the Groves of Vulcan, Venus, and the little youth Cupid; of Mars, Bellona, Bacchus, Silvanus, and that of the Muſes near Helicon, dedicated by the ſame Numa, their great Patron; and hence had they their

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name *Camœnæ* *. In this was the noble ſtatue of Eupheme, nurſe to thoſe Poetical Ladies; and ſo the Feranian, and even *Mons Parnaſſus*, were thick ſhaded with trees. Nor may we omit the more impure *Lupercal Groves*, ſacred, or profaned rather, yet moſt famous for their affording ſhelter and foſter to Romulus and his brother Remus.

That of Vulcan was uſually guarded by dogs, like the town of St. Malo's in Bretaigne: The Pinea Silva appertained to the Mother of the Gods, as we find in Virgil. Venus had ſeveral Groves in Egypt, and in the Indian iſland, where once ſtood thoſe famous ſtatues cut by Praxiteles; another alſo in Pontus, where, if you will believe it, hung up the Golden Fleece, meed of the bold Adventurer. Nor was the watry king Neptune without his Groves, the Helicean in Greece was his. So Ceres, and Proſerpine, Pluto, Veſta, Caſtor, and Pollux, had ſuch ſhady places conſecrated to them. Add to theſe the Lebadian, Arſinoan, Paphian, Senonian, and ſuch as were in general dedicated to all the Gods, for

————————Habitarunt Dî quoque Silvas.

————————Gods have dwelt in Groves.

and theſe were as it were Pantheons.——

To the memory of famous Men and Heroes were conſecrated the Achillean, Aglauran, and thoſe to Bellerophon, Hector, and Alexander; to others alſo who diſdained not to derive their names from trees and foreſts, as Silvius the Poſthumus of Æneas, and divers of the Albanian Princes and great perſons; Stolon, Laura, Daphnis, &c. And a certain cuſtom there was for the parents to plant a tree at the birth of an heir or ſon, preſaging by the growth and thriving of the tree the proſperity of the child: Thus we read in the life of Virgil, how far his natalitial Poplar

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* The learned and ingenious Mr. Bryant is the only perſon who has given us a ſatisfactory derivation of the word *Camœnæ*. He ſays, the Camœnæ of Latium, who were ſuppoſed to have ſhewn the ſacred Fountain to the Veſtals, were probably the original Prieſteſſes, whoſe buſineſs it was to fetch water for Luſtrations from that Stream. For Cam-Ain (in the Amonian language) is the Fountain of the Sun: and the Camœnæ were named from their attendance upon that Deity. The Hymns in the Temples of this God were ſung by theſe Women: Hence the Camœnæ were made Preſidents of Muſic. *Analyſis*, Vol.. I.

had outſtripped the reſt of its contemporaries. And the reaſon doubtleſs of all this was the general repute of the ſanctity of thoſe places; for no ſooner does the Poet ſpeak of a Grove, but immediately ſome conſecration follows, as believing that out of thoſe ſhady profundities ſome Deity muſt needs emerge:

Quo poſſis viſo dicere Numen ineſt.

So as Tacitus (ſpeaking of the Germans) ſays, *Lucos & Nemora conſecrant, Deorumque nominibus appellant ſecretum illud, quod ſolâ reverentiâ vident:* To the ſame purpoſe, Pliny, lib. xii. cap. 1. tells us, *Arbores fuere Numinum templa*, in which (ſays he) they did not ſo much revere the golden and ivory ſtatues, as the goodly trees and awful ſilence: and the conſecration of theſe nemorous places, together with the expreſs rites thereof, we find in Quintus Curtius, and in what Paulus Diaconus relates of the Longobards, who not being capable of philoſophiſing on the phyſical cauſes, which they deemed ſupernatural, and plainly divine, were allured, as it is likely, by the gloomineſs of the ſhade, procerity and altitude of the ſtem, floridneſs of the leaves, and other accidents; ſo as to uſe the words of Prudentius,

Quos penes omne ſacrum eſt, quicquid formido tremendum
Suaſerit horificos, quos prodigialia cogunt
Monſtra Deos——— Lib. ii. *Cont. Sym.*

Here all religion paid; whoſe dark receſs
A ſacred awe does on their mind impreſs,
To their wild Gods———

And this deification of their trees, amongſt other things, beſides their age and perennial veridity, ſays Diodorus, might ſpring from the manifold uſe which they afforded, and which haply had been taught them by the Gods, or rather by ſome god-like perſons, whom for their worth, and the public benefit, they eſteemed ſo; and it might be a motive to this reverence, that divers of them were voiced to have been metamorphoſed from men into trees, and again out of trees into men, as the Arcadians gloried in their birth, when

Genſque virûm, truncis, & rupto Robore nati.

Out of the teeming bark of Oaks men burſt:

BOOK IV. Which perhaps they fancied, by ſeeing men creep ſometimes out of their cavities, in which they often lodged and ſecured themſelves:

Quippe aliter tunc orbe novo cœloque recenti
Vivebant homines, qui rupto Robore nati.

JUVEN. lib. ii.

For in the earth's nonage under heav'n's new frame,
They ſtricter liv'd, who from Oaks rupture came.

Or as the ſweet Papinius again:

————Nemorum vos ſtirpe rigenti
——Fama fatos, cum prima pedum veſtigia tellus
Admirata tulit, nondum arva, domûſque ferebant,
Cruda puerperia, ac populos umbroſa creavit
Fraxinus, & fœtâ viridis puer excidit Orno:
Hi lucis ſtupuiſſe vices, noctiſque feruntur,
Nubila, & occiduum longe Titana ſecuti
Deſperâſſe diem——

Fame goes, that ye brake forth from the hard rind,
When the new earth with the firſt feet was ſign'd:
Fields yet nor houſes doleful pangs reliev'd,
But ſhady Aſh the num'rous births receiv'd,
And the green babe drop'd from the pregnant Elm,
Whom ſtrange amazement firſt did overwhelm
At break of day, and when the gloomy night
Raviſh'd the ſun from their purſuing ſight,
Gave it for loſt———

Almoſt like that which Rinaldo ſaw in the enchanted foreſt:

Quercia gli appar, che perſe ſteſſa inciſa
Apre feconda il cavo ventre, è figlia;
En' eſce fuor veſtita in ſtrania guiſa
Ninfa d' età creſciuta—— CANTO 18.

An aged Oak beſides him cleft and rent,
And from his fertile hollow womb forth went

(Clad in rare weeds, and ſtrange habiliment)
A full-grown Nymph.——

And that every great tree included a certain tutelar Genius or Nymph living and dying with it, the Poets are full; a ſpecial inſtance we have in that prodigious Oak which fell by the fatal ſtroke of Eriſichthon; but the Hamadryads, it ſeems, were immortal, and had power to remove and change their wooden habitations.

In the mean while, as the fall of a very aged Oak, giving a crack like thunder, has been often heard at many miles diſtance, conſtrained though I often am to fell them with reluctancy, I do not at any time remember to have heard the groans of thoſe nymphs (grieving to be diſpoſſeſſed of their antient habitations) without ſome emotion and pity. Now to ſhew that many ſuch diſaſters as that which befell Eriſichthon have happened to the owners of places where goodly trees have been felled, I cannot forget *one*, who giving the firſt ſtroke of the ax with his own hand, and doubtleſs purſuing it with more, killed his own *Father* by the fall of the tree, not without giving the uncautious *Knight* (for ſo he was) ſufficient warning to avoid it. And here I muſt not paſs by the *Groaning-Board* which they kept for a while in Southwark, drawing abundance of people to ſee the wonder; ſuch another plant had been formerly, it ſeems, expoſed as a miracle at *Caumont*, near *Toloufe*, in France; and the like ſometimes happens in woods and foreſts, through the incluſion of the air within the cavities of the timber; and ſomething of this kind perhaps gave heretofore occaſion of the fabulous *Dodonean Oracle*. But however this were, methinks I ſtill hear, ſure I am that I ſtill feel, the diſmal groans of our foreſts; that late dreadful hurricane (happening on the 26th of November, 1703) having ſubverted ſo many thouſands of goodly Oaks, proſtrating the trees, laying them in ghaſtly poſtures, like whole regiments fallen in battle by the ſword of the Conqueror, and cruſhing all that grew beneath them. Such was the proſpect of many miles in ſeveral places, reſembling that of Mount Taurus, ſo naturally deſcribed by the Poet, ſpeaking of the fall of the Minotaurs ſlain by Theſeus:

——————Illa procul radicitus exturbata,
Prona cadit, late quacumvis obvia frangens.

The loſſes and dreadful ſtories of this ruin were indeed great, but how much greater the univerſal devaſtation through the kingdom! The public

BOOK IV.

accounts reckon no leſs than 3000 brave Oaks in one part only of the Foreſt of Dean blown down; in New-Foreſt in Hampſhire, about 4000; and in about 450 Parks and Groves, from 200 large trees to 1000 of excellent timber, without counting fruit and orchard trees ſans number; and proportionably the ſame through all the conſiderable woods of the nation.

Sir Edward Harly had 1300 blown down; myſelf above 2000; ſeveral of which, torn up by their fall, raiſed mounds of earth near twenty feet high, with great ſtones intangled among the roots and rubbiſh; and this almoſt within ſight of my dwelling, (now no longer * Wotton) ſufficient to mortify and change my too great affection and application to this work, which, as I contentedly ſubmit to, ſo I thank God for what are yet left ſtanding: *Nepotibus umbram.*

* Wood-Town.

Lactantius reports of a people who worſhipped the *Wind*, as ſome at this day among the Indians do the *Devil*, that he may do them no harm.

What this Prince of the Air did to *Job* and his religious family, for the trial of his patience, by God's permiſſion, the Scripture tells us: And for what cauſe he ſtill ſuffers that malicious ſpirit to exert his fury in theſe lower regions, the ſame God only knows; though certainly for our chaſtiſement; and therefore reformation, ſubmiſſion, and patience will become our beſt ſecurity.

Scaliger the Father affirms, he could never convince his learned antagoniſt Eraſmus, but that trees feel the firſt ſtroke of the ax, and diſcover a certain reſentment; and indeed they ſeem to hold the edge of the fatal tool, till a wide gap be made: And ſo exceedingly apprehenſive they are of their deſtruction, that, as *Zoroaſter* ſays, if a man come with a ſharp bill intending to fell a *barren tree*, and a friend importunately deprecate the angry perſon, and prevail with him to ſpare it, the tree will infallibly *bear* plentifully the next year. Such is the ſuperſtitious ſanctity and folly of ſome credulous people.

We might here indeed produce the wonderful ſtrange Apparitions of Spirits interceding for the ſtanding and life of trees, when the ax has been ready for execution; as you may ſee in that Hymn of Callimachus, Pauſanias, and the famous ſtory of Paræbius, related by Apollonius in 2 *Argonaut.* with the fearful cataſtrophe of ſuch as cauſeleſsly and wantonly

violated thoſe goodly plantations (from which fables aroſe that of the Dodonean and Vocal Foreſts, frequent in Heathen Writers); but in none ſo elegantly as in that tale by the witty Ovid, deſcribing the fact of the wicked Eriſichthon:

As Fame reports, his Hand an Ax ſuſtain'd,
Which Ceres' conſecrated Grove prophan'd;
Which durſt the venerable Gloom invade,
And violate with Light the awful Shade.
An antient Oak in the dark Centre ſtood,
The Covert's Glory, and itſelf a Wood:
Garlands embrac'd its Shaft, and from the Boughs
Hung Tablets, Monuments of proſp'rous Vows.
In the cool Duſk its unpierc'd Verdure ſpread,
The Dryads oft their hallow'd Dances led;
And oft, when round their gaging Arms they caſt,
Full fifteen Ells it meaſur'd in the Waiſt:
Its Height all under Standards did ſurpaſs,
As they aſpir'd above the humbler Graſs.

Theſe Motives, which would gentler Minds reſtrain,
Could not make Triope's bold Son abſtain;
He ſternly charg'd his Slaves with ſtrict Decree,
To fell with gaſhing Steel the ſacred Tree.
But whilſt they, ling'ring, his Commands delay'd,
He ſnatch'd an Ax, and thus blaſpheming ſaid;
Was this no Oak, nor Ceres' favourite Care,
But Ceres' ſelf, this Arm, unaw'd, ſhou'd dare
Its leafy Honours in the Duſt to ſpread,
And level with the Earth its airy Head.
He ſpoke, and as he pois'd a ſlanting Stroke,
Sighs heav'd, and Tremblings ſhook the frighted Oak;
Its leaves look'd ſickly, pale its Acorns grew,
And its long Branches ſweat a chilly Dew.
But when his impious Hand a Wound beſtow'd,
Blood from the mangled Bark in Currents flow'd.
When a devoted Bull of mighty Size,
A ſinning Nation's grand Atonement, dies;
With ſuch a Plenty from the ſpouting Veins,
A crimſon Stream the turfy Altars ſtains.

The Wonder all amaz'd; yet one more bold,
The Fact diſſuading, ſtrove his Ax to hold.
But the Theſſalian, obſtinately bent,
Too proud to change, too harden'd to repent,
On his kind Monitor, his Eyes, which burn'd
With Rage, and with his Eyes his Weapon turn'd;
Take the Reward, ſays he, of pious Dread:
Then with a Blow lopp'd off his parted Head.
No longer check'd, the Wretch his Crime purſu'd,
Doubled his Strokes, and Sacrilege renew'd;
When from the groaning Trunk a Voice was heard,
A Dryad I, by Ceres' Love preferr'd,
Within the Circle of this claſping Rind
Coëval grew, and now in Ruin join'd;
But inſtant Vengeance ſhall thy Sin purſue,
And Death is chear'd with this prophetick View.

At laſt the Oak with Cords enforc'd to bow,
Strain'd from the Top, and ſap'd with Wounds below,
The humbler Wood, Partaker of its Fate,
Cruſh'd with its Fall, and ſhiver'd with its Weight.

DRYDEN'S OVID.

But a ſad revenge follows it, as the Poet will tell you: And one might fill a juſt volume with the Hiſtories of Groves that were violated by wicked men who came to fatal periods, eſpecially thoſe upon which the Miſleto grew, than which nothing was reputed more ſacred; for amongſt ſuch Oaks the Druids uſually dwelt,

——— Nemora alta remotis
Incolitis Lucis ——— LUCAN.

and with whoſe leaves they adorned and celebrated their Religious Rites. "The Druids," ſays Pliny, lib. xvi. cap. xliv. "for ſo they call their Divines, eſteem nothing more venerable than Miſleto, and the Oak upon which it grows." Indeed they did nothing of importance without ſome leaves or branches of this tree, and they eſteemed its very *excreſcence* as ſent from Heaven. The Miſleto was not to be gathered, but cut by the Prieſt with a golden ax, praying for a bleſſing upon the Divine Gift; after

this two white bulls were offered up as a ſacrifice. But for this conſult (beſides Pliny) *Mela*, *Lactantius*, *Euſebius de præparat. Evangel.* and the *Aulularia* of *Pſeudo-Plautus*, *Camden*, and others; whilſt, as to that *excreſcence*, I relate the diſaſters which happened to two men who, not long ſince, felled a goodly tree, called the *Vicar's Oak*, ſtanding at *Norwood*, (not far from *Croydon)* partly belonging to the Archbiſhop, and was limit to four pariſhes which met in a point; on this Oak grew an extraordinary branch of Miſleto, which in the time of the *ſacrilegious uſurpers* they were wont to cut and ſell to an Apothecary of London; and though warned of the misfortunes obſerved to befall thoſe who injured this *plant*, proceeded not only to cut it quite off, without leaving a ſprig remaining, but to demoliſh and fell the Oak itſelf alſo. The firſt ſoon after loſt his eye, and the other broke his leg, as if the *Hamadryads* had revenged the indignity.

It is reported that the *Minturenſian Grove* was eſteemed ſo venerable, that a ſtranger might not be admitted into it; and the great Xerxes himſelf, when he paſſed through Achaia, would not touch a Grove which was dedicated to Jupiter, commanding his army to do it no violence; and the honours he did to one ſingle (but a goodly) Platanus, we have already mentioned. The like to this we find when the Perſians were put to flight by Pauſanias; though they might have ſaved their lives by it, as appears in the ſtory. The ſame reverence made Hercules not ſo much as taſte the waters of the Ægerian Groves, after he ſlew Cacus, though extremely thirſty.

——————At talibus alma ſacerdos
Puniceo canas ſtamine vincta comas:
Parce oculis, hoſpes, Lucoque abſcede verendo;
Cede agedum, & tuta limina linque fuga.
Interdicta viris metuenda lege piatur,
Quæ ſe ſummota vindicat ara caſa.
Dii tibi dent alios fontes —————— PROPERT. l. iv.

——— The Prieſteſs ſaid,
(A purple fillet bound her hoary head)
Stranger, pry not, but quit this ſhady ſeat:
Avant, and whiles thou ſafely may'ſt, retreat.
To men forbid, and by hard ſanction bound:
Far better other ſprings were by thee found.

Book IV. Nor indeed was it lawful to hunt in ſuch places, unleſs it were to kill for ſacrifice, as we read in Arrianus; whence it is reported by Strabo, that in the Ætolian Groves, ſacred to Diana, the beaſts were ſo tame, that the very wolves and ſtags fed together like lambs, and would follow a man licking his hands, and fawning on him. Such a Grove was the *Crotonian*, in which Livy writes, there was a ſpacious field ſtored with all ſorts of game. There were many foreſts conſecrated to *Jupiter*, *Juno*, and *Apollo*; eſpecially the famous *Epidaphne*, near the *Syrian Antioch*, which was moſt incomparably pleaſant, and adorned with fountains and rare ſtatues. * There was to be ſeen the *Laurel* which had been his chaſte *Miſtreſs*, and in the centre of it his *Temple*, an *Aſylum*: Here it was that *Coſroes* and *Julian* did ſacrifice upon ſeveral occaſions, as *Euſebius* relates, but could not with all their impious arts obtain an anſwer, becauſe the holy *Babylas* had been interred near that Oracle; for which it was reputed ſo venerable, that there remained an expreſs Title in the Code, *de Cupreſſis ex Luco Daphnes non excidendis, vel venundandis*, "that none ſhould either fell or ſell any of the trees about it," which may ſerve for another inſtance of their burying in ſuch places. The truth is, ſo exceedingly ſuperſtitious they were, and tender, that there was almoſt no meddling with theſe devoted trees; and even before they did but *conlucare* and prune one of them, they were firſt to ſacrifice, leſt they might offend in ſomething ignorantly: But to *cut down* was *capital*, and never to be done away with any offering whatſoever; and therefore *conlucare* in authors is not (as ſome pretend) *ſuccidere*, but to *prune* the branches only; and yet even this gentle tonſure of ſuperfluities was reputed a kind of contamination; and hence *Lucus coinquinari dicitur*, unleſs in the caſe of *Lightning*, when *Cælo tacta*, a whole tree might quite be felled, as marked by Heaven for the fire: But of this ſufficient. We could indeed fill many ſheets with the cataſtrophe of ſuch as maliciouſly deſtroyed Groves, to feed either their revenge or avarice; ſee Plutarch in Pericles, and the ſaying of Pompeius. Cicero ſharply reproves C. Gabinius for his prodigious ſpoil in Greece; and it was of late days held a piece of inhumanity in Charles the French King, when he entered the Friſons, after he had ſlain their leader, to cut down their woods; a puniſhment never inflicted by ſober Princes, but to prevent Idolatry in the old Law, and to ſhew the heinouſneſs of diſloyalty and treaſon by latter ſanctions; in which caſe, and for terror, even a traitor's woods have become anathema, as were eaſy to inſtance out of hiſtories.

* See this delicious place elegantly deſcribed by S. Chryſoſtom, lib. de S. Babyl. tom. vi. p. 671. Sozom. lib. vi. cap. xix. Niceph. lib. x. cap. xxviii.

Salmaſ. exer. Plin. Solin.

But what ſhall we ſay then of our late prodigious *Spoilers*, whoſe furious devaſtation of ſo many goodly woods and foreſts have bequeathed an

infamy on their names and memories, not quickly to be forgotten! I mean our unhappy *Uſurpers* and injurious *Sequeſtrators*; not here to mention the deplorable neceſſities of a gallant and loyal *Gentry*, who, for their *Compoſitions*, were, many of them, compelled to add yet to this *Waſte*, by an inhuman and unparalleled *Tyranny* over them, to preſerve the poor remainder of their *Fortunes* and to find them *Bread*.

Nor was it here they deſiſted; for after the fate of that once beautiful Grove under Greenwich caſtle, (of late ſupplied by his preſent Majeſty) even the royal walk of Elms in St. James's park

"That living gallery of aged trees,"

was once propoſed to the late Council of State (as they called it) to be cut down and ſold; that, with the reſt of his Majeſty's houſes already demoliſhed, and marked out for deſtruction, his trees might likewiſe undergo the ſame deſtiny, and no footſteps of *monarchy* remain unviolated.

It is from hence you may calculate what were the *deſigns* of thoſe excellent *Reformers*, and the care theſe great *Stateſmen* took for the preſervation of their *country*, when, being *parties* in the *booty* themſelves, they gave way to ſo diſhonourable and impolitick a *waſte* of that *material*, which being left entire, or huſbanded with diſcretion, had proved the beſt ſupport and defence of it. But this (ſay they) was the effect of *war*, and in the height of our *contentions*. No, it was a *late* and *cold deliberation*, and long after all had been ſubdued to them; nor could the moſt implacable of *enemies* have expreſſed a reſolution more barbarous. For, as our own incomparable Poet deſcribes it,

———'Twas not enough alone to take the ſpoils
Of God's and the king's houſes; theſe unjuſt.
And impious men deſtroy the ſtately piles:
Of ev'ry ruin there's a wicked luſt.

In every place the groaning carts are fill'd
With beams and ſtones; ſo buſy and ſo loud
Are the proud victors, as they meant to build:
But they to ruin and deſtruction crowd.

Timber, which had been buried many years
Under ſuch royal towers, they invade:

'Tis ſure that hand the living never ſpares,
Which is ſo wicked to diſturb the dead.

Then all the woods the barbarous victors ſeize,
(The noble nurſery of the fleet and town,
The hopes of war and ornaments of peace)
Which once religion did as ſacred own.

Now public uſe, and great convenience claims,
The woods from private hands inviolate;
Which greedy men, to leſs devouring flames,
Do for ſweet lucre freely dedicate.

No age they ſpare, the tender Elm and Beech,
Infants of thirty years they overthrow;
Nor could old age itſelf their pity reach,
No reverence to hoary barks they know.

The unhappy birds, an ever-ſinging choir,
Are driven from their antient ſhady ſeats,
And a new grief does Philomel inſpire
With mournful notes, which ſhe all night repeats.

Let them the woods and foreſt burn and waſte,
There will be trees to hang the ſlaves at laſt;
And God, who ſuch infernal men diſclaims,
Will root 'em out, and throw 'em into flames.

In which he has ſhewed himſelf as well a *Prophet* as a *Poet*.

We have ſpoken of the great Xerxes, that, paſſing conqueror through *Achaia*, he would not ſuffer his army to violate ſo much as a tree of his adverſaries; and have ſufficiently obſerved from the antients, that the Gods did never permit them to eſcape unpuniſhed who were injurious to *Groves*. What became of Agamemnon's hoſt after his ſpoil of the woods at Aulis? Hiſtories tell us Cleomenes died mad: The *Temeſæan Genius* became proverbial; and the deſtructive fact that the enraged Cæſar perpetrated on the *Maſſilian* trees, went not long unrevenged; thus related

by the poet, and an illuſtrious record of all we have hitherto produced, to aſſert their veneration.

Lucus erat longo nunquam violatus ab ævo, &c. LUCAN, lib. iii.

Lucum Eſculapio dicatum ſuccideratTurullius; manifeſtis Numinis illius viribus, eum in Lucum quem violaverat, ille attractus eſt, effecitque Deus ut ibi potiſſimum occideretur. Vide Valer. Max. lib. i. cap. i. n. 19.

Not far away for ages paſt had ſtood
An old inviolated ſacred wood;
Whoſe gloomy boughs, thick interwoven, made
A chilly chearleſs everlaſting ſhade:
There, nor the ruſtic gods, nor ſatyrs ſport,
Nor fawns and ſylvans with the nymphs reſort:
But barb'rous prieſts ſome dreadful pow'r adore,
And luſtrate ev'ry tree with human gore.
If myſteries in times of old receiv'd,
And pious antientry be yet believ'd,
There nor the feather'd ſongſter builds her neſt,
Nor lonely dens conceal the ſavage beaſt:
There no tempeſtuous winds preſume to fly,
Ev'n lightnings glance aloof, and ſhoot obliquely by.
No wanton breezes toſs the dancing leaves,
But ſhiv'ring horror in the branches heaves.
Black ſprings with pitchy ſtreams divide the ground,
And bubling tumble with a ſullen ſound.
Old images of forms miſhapen ſtand,
Rude and unknowing of the artiſt's hand;
With hoary filth begrim'd, each ghaſtly head
Strikes the aſtoniſh'd gazer's ſoul with dread.
No gods, who long in common ſhapes appear'd,
Where'er with ſuch religious awe rever'd:
But zealous crouds in ignorance adore,
And ſtill the leſs they know, they fear the more.
Oft (as fame tells) the earth in ſounds of woe
Is heard to grone from hollow depths below:
The baleful yew, tho' dead, has oft been ſeen
To riſe from earth, and ſpring with duſky green;
With ſparkling flames the trees unburning ſhine,
And round their boles prodigious ſerpents twine.
The pious worſhippers approach not near,
But ſhun their gods, and kneel with diſtant fear:

The prieſt himſelf, when, or the day, or night,
Rolling have reach'd their full meridian height,
Refrains the gloomy paths with wary feet,
Dreading the Dæmon of the Grove to meet;
Who, terrible to fight, at that fix'd hour,
Still treads the round about his dreary bow'r.

This wood, near neighb'ring to the encompaſs'd town,
Untouch'd by former wars remain'd alone;
And ſince the country round it naked ſtands,
From hence the Latian Chief ſupplies demands.
But lo! the bolder hands, that ſhould have ſtruck,
With ſome unuſual horror trembling ſhook;
With ſilent dread and rev'rence they ſurvey'd
The gloom majeſtic of the ſacred ſhade:
None dares with impious ſteel the bark to rend,
Leſt on himſelf the deſtin'd ſtroke deſcend.
Cæſar perceiv'd the ſpreading fear to grow,
Then, eager, caught an ax, and aim'd a blow.
Deep ſunk within a violated Oak
The wounding edge, and thus the warrior ſpoke:
Now, let no doubting hand the taſk decline;
Cut you the wood, and let the guilt be mine.

And ſo it was, as he carried (it is thought) the *maledictions* of the incenſed Gauls to his funeral pile:

——Quis enim læſos impune putaret
Eſſe deos——————

——————For who,
The Gods thus injur'd, unreveng'd does go?

But, leſt this be charged with ſuperſtition, becauſe the inſtances are heathen, it was a more noble and remarkable, as well as recent example, when, at the ſiege of *Breda*, the late famous General Spinola commanded his army not to violate a tree of a certain wood belonging to the Prince of Orange there, though a reputed traitor, and in open defiance with his maſter. In ſum, we read, that when Mithridates but deliberated about

the cutting down of ſome ſtately trees which grew near *Patara*, a city of *Lycia*, though neceſſitated to it for the building of warlike engines with them, being terrified in a viſion, he deſiſted from his purpoſe. It were to be wiſhed that theſe, or the like examples, might have wrought ſome effects upon the ſacrilegious *purchaſers* and diſloyal *invaders* in this iron age amongſt us, who, to gratify an impious and unworthy avarice, have lately made ſo prodigious a ſpoil of thoſe goodly foreſts, woods, and trees, which, being once the treaſure and ornament of this nation, were doubtleſs reſerved by our more prudent anceſtors for the repairs of our floating caſtles, the ſafeguard and boaſt of this renowned iſland, when neceſſity, or ſome imminent peril ſhould threaten it, or call for their aſſiſtance, and not tranſmitted to be devoured by theſe improvident wretches, who, to their eternal reproach, did, together with the Royal Patrimony, ſwallow likewiſe God's own inheritance. But their ſons and grand children we have lived to ſee as haſtily diſgorge them again, and with them all the reſt of their holy purchaſes, which otherwiſe they might ſecurely have enjoyed. But this, *in terrorem* only, and for caution to poſterity, whiles we leave the guilty, and thoſe who have done the miſchiefs, to their proper Scorpions, and to their Eriſichthonian fate, or to that of the inexorable Paræbius, the vengeance of the Dryads; and to their tutelar better genius, if any yet remain who love the ſolid honour and ornament of their country: For (though conſtrained by neceſſity myſelf, to cut down ſo many goodly trees and venerable woods, devoted to the ax by the owner, who had a right to diſpoſe of them before me) Ὑλογενὴς, and Wood-born * as I am, what could I ſay leſs in behalf of thoſe ſacred ſhades, which both grace our habitations, and protect our nation?

Quæ tibi factorum pœnas inſtare tuorum Vaticinor——

Vide Met. l. 8. Apollon. l. 2. Argonaut. Proſternit Quercum funeſtam quam ſibi Nympha Pignoribuſque ſuis fecit——

* At Wotton in Surry.

So in all ages, from trees have been denominated whole countries, regions, cities, and towns; as Cypariſſa in Greece, Ceraſus in Pontus, Laurentum in Italy, Myrrhinus in Attica. Ports alſo, mountains and eminent places; as the Viminalis, Æſculetum, &c. and the obvious reaſon is the ſpontaneous growth and abounding of ſuch trees in the reſpective ſoil. The reverſe is ſometimes obſerved; *Avellana nux* is called alſo *Prænestina*, *Pontica*; *dum unaquæque natio indit huic nuci nomen ex loco in quo naſcitur copioſior:* So the Cheſnut is called Heracleotica, of which ſee Macrob. Saturnal. lib. iii. Sylvius became a great and famous name among the Latins and Romans, as Sylvius Poſthumus, the Son of that renowned Hero Æneas Sylvius; and in time an hereditary name among the ſubſe-

quent kings: Latinus Sylvius, Alba Sylvius, who built that glorious city which contended with Rome herſelf. To return to our own country: Seven Oaks in Kent was ſo called, as reported, from ſome goodly Oaks growing about it; and Old Sarum, or Sorbiodunum, had its name *à Sorbis*.

Hence alſo from the plenty of Beech trees does Mr. Camden denominate the whole country of Buckingham, Bukenham in Norfolk, Buchonia in Germany, &c. though indeed the learned Author of the Additions to the late Edition, thinks them rather ſo called from the Saxon Buc *(Cervus)* a buck or hart, and this from that in Norfolk, as Sir Henry Spelman reports, there are no ſuch trees growing; whilſt we yet know not whether there may not formerly have been ſtore: In all events, be it one or the other, it is certain, abundance of places, countries, and families, have taken their denomination from trees.

One thing more I think not impertinent to hint, before I take my leave of this Book, concerning the Uſe of Standing Groves: That in ſome places of the world they have no other water to drink than what their trees afford them; not only of their proper juice, (as we have noted) but from their attraction of the Evening Moiſture, which impends in the ſhape of a cloud over them: Such a tuft of trees is in the iſland of Ferro; of which conſult the learned Iſaac Voſſius upon Pomponius Mela, and Magnenus de Manna: The ſame likewiſe happeneth in the Indies; ſo that if their woods were once deſtroyed, they might periſh for want of rains; upon which account Barbadoes grows every year more torrid, and has not near the rain it formerly enjoyed when it was better furniſhed with trees; and ſo in Jamaica, at Gunaboa, the rains are obſerved to diminiſh as their plantations extend: The like I could tell you of ſome parts of England not far from hence.

And now, laſtly, to encourage thoſe to plant that have opportunity, and thoſe who innocently and with reluctancy are forced to cut down, and endeavour to ſupply the waſte with their utmoſt induſtry: It is obſerved, that ſuch planters are often bleſſed with health and old age, according to that of the prophet Iſaiah, lx. 22. "The days of a tree are the days of my people." Of their extraordinary longævity we have given abundant inſtances in this Diſcourſe; and it ſeems to be ſo univerſally remarked, that as Paulus Venetus (that great traveller) reports, the Tartarian Aſtrologers

affirm, nothing contributes more to men's long lives than the planting of many trees. *HÆC SCRIPSI OCTAGENARIUS*, and ſhall, if God protract my years, and continue my health, be continually planting, till it ſhall pleaſe him to *tranſplant* me into thoſe glorious regions above, the celeſtial paradiſe, planted with Perennial Groves and Trees, bearing immortal fruit; for ſuch is the tree of life, which they who do his commandments have right to, Apoc. xxii. 2, 14, 20. Ναὶ ἔρχομαι ταχὺ, Ἀμὴν, ναὶ, ἔρχου Κύριε Ιησοῦ, Ἀμην.

Thus my reader ſees, and I acknowledge, how eaſy it is to be loſt in the wood, and that I have hardly power to take off my pen whilſt I am on this delightful ſubject; for what more auguſt, more charming, and uſeful, than the culture and preſervation of ſuch goodly plantations:

That ſhade to our grand-children give. VIRGIL.

What affords ſo ſweet and ſo agreeable refreſhment to our induſtrious Wood-man,

When he his wearied limbs has laid
Under a florid Platan's ſhade,. CLAUDIAN.

or ſome other goodly-ſpreading tree, ſuch as we told you ſtopt the legions of a proud Conqueror,. and that the wiſe Socrates ſware by?

But whilſt we condemn this exceſs in them, Chriſtians and true Philoſophers may be inſtructed to make uſe of their enjoyments to better purpoſes, by contemplating the miracles of their production and ſtructure. And what Mortal is there ſo perfect an Atomiſt, who will undertake to detect the thouſandth part, or point, of ſo exile a grain, as that inſenſible rudiment, or rather halituous ſpirit, which brings forth the lofty Fir-tree, and the ſpreading Oak? That trees of ſo enormous an height and magnitude, as we find ſome Elms, Planes, and Cypreſſes; that others hard as iron, and ſolid as marble, (for ſuch the Indies furniſh) ſhould be ſwaddled and involved within ſo ſmall a dimenſion, (if a point may be ſaid to have any) and in ſo weak and feeble a ſubſtance, without the leaſt luxation, confuſion, or diſorder of parts! That when they are buried in the moiſt womb of the earth, which ſo eaſily diſſolves and corrupts ſubſtances ſo much harder, yet this, which is at firſt but a kind of tender mucilage, or rather rottenneſs, ſhould be able in time to diſplace and rend aſunder whole rocks of ſtone, and ſometimes to cleave them beyond the force of iron wedges,

BOOK IV. ſo as even to remove mountains! That our tree, like man, (whoſe inverted ſymbol he is) being ſown in corruption, riſes in glory, and by little and little aſcending into an hard erect ſtem of comely dimenſions, becometh a ſolid tower, as it were! And that this which but lately a ſingle ant would eaſily have borne to his little cavern, ſhould now become capable of reſiſting the fury, and braving the rage of the moſt impetuous ſtorms,—— *magni mehercle artificis, clauſiſſe totum in tam exiguo, & horror eſt conſideranti.*

Seneca, Epiſt. lüi.

For is it not plainly aſtoniſhing, how theſe minute atoms, rather than viſible eggs, ſhould contain the fœtus exquiſitely formed, (even while yet wrapped in their ſecundines, like infants in the animal womb) till growing too big for their dark confinements, they break forth, and after a while more diſtinctly diſplay every limb and member compleatly perfect, with all their apparel, tire, and trim of beautiful and flouriſhing vegetables, endowed with all the qualities of the ſpecies?

Contemplate we again what it is which begins the motion, and kindles the flame of theſe *Automata*, cauſing them firſt to radiate in the earth, and then to diſplay their top in the air (ſo different poles, as I may call them, in ſuch different mediums); what it is which imparts theſe elaſtic, periſtaltic, and other motions, ſo very like to the ſenſible and perfecteſt animal, how they elect, and then introſume their proper food, and give ſuck, as it were, to the yet tender infant, till it have ſtrength and force to prey on, and digeſt the more ſolid juices of the earth; for then, and not till then, do the roots begin to harden. Conſider we how they aſſimilate, ſeparate, and diſtribute theſe ſeveral ſupplies; how they concoct, tranſmute, augment, produce, and nouriſh without ſeparation of excrements (at leaſt to us viſible); how without violation of virginity they generate their like; whilſt furniſhed with tubes, ovaries, umbilical, and other veſſels, the principle of any ſpecies, they are ſafely reſerved and nouriſhed till delivered: By what exquiſite percolations and fermentations they proceed; how for the heart, fibres, veins, nerves, valves, and anaſtomotas, they are furniſhed with rind, branches, leaves, bloſſoms, and fruit; how their colour, taſte, odour, and other ſtupendous qualities and diſtinct faculties, ſome of them ſo repugnant and contrary to others, yet in ſo uniform and ſucceſſive a ſeries, are elaborated; and all this performed in the dark, and ſecret receſſes of nature. It is aſtoniſhing with what analogy * the ſolider and inflexible parts of trees agree with the bones, ribs, vertebræ, &c. nay, how the more pliables fitted to ſuch various motions accord with the very

* See Scaliger Exerc. 14. of reſpondent parts within and without, from head to foot.

brains and marrow. This has induced ſome to allow them place amongſt the claſs of animals.

For their preſervation, nature has inveſted the whole tribe and nation (as we may ſay) of vegetables, with garments ſuitable to their naked and expoſed bodies, temper, and climate: Thus ſome are clad with a coarſer, and reſiſt all extremes of weather; others with more tender and delicate ſkins and ſcarfs, as it were, and thinner raiment. *Quid foliorum deſcribam diverſitates?* What ſhall we ſay of the myſterious forms, variety, and variegation of the leaves and flowers, contrived with ſuch art, yet without art; ſome round, others long, oval, multangular, indented, criſped, rough, ſmooth and poliſhed, ſoft and flexible; at every tremulous blaſt, as if it would drop in a moment, and yet ſo obſtinately adhering, as to be able to conteſt againſt the fierceſt winds that proſtrate mighty ſtructures!—— There it abides till God bids it fall: For ſo the wiſe Diſpoſer of things has placed it, not only for ornament, but uſe and protection both of body and fruit, from the exceſſive heat of ſummer, and colds of the ſharpeſt winters, and their immediate impreſſions; as we find it in all ſuch places and trees, as, like the bleſſed and good man, have always fruit upon them ripe, or preparing to mature; ſuch as the Pine, Fir, Arbutus, Orange, and moſt of thoſe which the Indies and more ſouthern tracts plentifully abound in, where Nature provides this continual ſhelter, and clothes them with perennial garments.

But with what amazement do we conſider what may be demonſtrated of their innumerable (and next to infinite) number of ſeeds, which, in an Elm, for inſtance, of but one hundred years ſtanding, which ſuppoſe to be the ordinary age of that ſpecies, would amount to 15480000000.— Suppoſe then the tree to grow and multiply as many times, and every individual grain to contain a ſecond tree, including the like number, and ſo on by geometrical progreſſion in ſquares and cubes. At what a loſs muſt the moſt enlarged human capacity be at ſo ſtupendous a conſideration!

Let us examine with what care the ſeeds, thoſe little ſouls of plants, *quorum exilitas*, as one ſays, *vix locum inveniat*, in which the whole and complete tree, tho' inviſible to our dull ſenſe, is yet perfectly and entirely wrapped up, expoſed, as they ſeem to be, to all thoſe accidents of weather, ſtorms, and rapacious birds, are yet preſerved from avolation, diminution, and detriment within their ſpiny, armed, and compacted receptacles; where

Book IV.

they ſleep as in their cauſes, till their priſons let them gently fall into the embraces of the earth, now made pregnant with the ſeaſon, and ready for another burden: for at the time of year ſhe fails not to bring them forth. With what delight have I beheld this tender and innumerable offspring repullulating at the feet of an aged tree! from whence the ſuckers are drawn, tranſplanted, and educated by human induſtry, and, forgetting the ferity of their nature, become civilized to all his employments.

Can we look on the prodigious quantity of liquor, which one poor wounded Birch will produce in a few hours, and not be aſtoniſhed how ſome trees ſhould, in ſo ſhort a ſpace, weep more than they weigh? And that ſo dry, ſo feeble, and wretched a branch, as that which bears the grape, ſhould yield a juice that chears both God and Man? That the Pine, Fir, Larch, and other reſinous trees, planted in ſuch rude and uncultivated places, amongſt rocks and dry pumices, ſhould tranſude into turpentine, and pearl out into gums and precious balms?

In a word, ſo aſtoniſhing and wonderful is the organiſm, parts, and functions of plants and trees, that ſome have, as we ſaid, attributed animal life to them, and conceived that they were living creatures; for ſo did Anaxagoras, Empedocles, and even Plato himſelf.

* Vide Petri Mangot. Bot. Monſpel.

I am ſure Plants and Trees afford more matter for Medicine *, and the uſe of Man, than either Animals or Minerals, are more familiar at hand, and ſafe; and within this late age being wonderfully improved, increaſed and ſearched into, they ſeem, by the Divine Wiſdom, an inexhauſtible ſubject for our diſquiſition and admiration.

There are ten thouſand conſiderations more, beſides that of their medicinal and ſanative properties, and the mechanical uſes mentioned in this Treatiſe, which a contemplative perſon may derive from the Groves and Woods; all of them the ſubject of wonder. And though he had only the Palm (which Strabo † affirms is fit for three hundred and ſixty uſes) or the Coco, (which yelds wine, bread, milk, oil, ſugar, ſalt, vinegar, tinctures, tans, ſpices, thread, needles, linen, cloth, cups, diſhes, ſpoons, and other veſſels and utenſils; baſkets, mats, umbrellas, paper, brooms, ropes, ſails, and almoſt all that belongs to the rigging of ſhips; in ſhort, this ſingle tree furniſhing a great part of the world with all that even a voluptuous man can need, or almoſt deſire) it were ſufficient to employ

† Vide Mr. Dodart's Hiſt. de l'Academ. des Sciences.

his meditations and his hands, as long as he were to live, though his years were as many as the moſt aged Oak: So as *Fr. Hernandes*, *Gracilaſco de la Vega*, and other Travellers *, ſpeaking of the Coco, Aloes, Wild Pine of Jamaica, &c. affirm there is nothing neceſſary for life *(ſi eſſet rebus humanis modus)* which theſe Polychreſts afford not.

* Vide Raii H. Pl. l. xxi. cap. vii.

What may we ſay then of innumerable other trees, fitted for the uſes nature has deſigned them, eſpecially for timber, and all other fabrile employments?——But I ceaſe to expatiate farther on theſe wonders, that I may not anticipate the pleaſures with which the ſerious Contemplator on thoſe ſtupendous works of Nature, or rather God of Nature, will find himſelf even rapt and tranſported, were his contemplations only applied to the production of a ſingle *Wood*.

Let the farther Curious, or thoſe who may take theſe wonders for a florid Epiphonema only of this work, add to the moſt antient Naturaliſts what they will find improved on this ample ſubject, in the late excellently learned and judicious Malpighius, Grew, Ray, Senertus, Faber, and others, who have defined theſe aſtoniſhing operations of nature, cauſes, and effects, with the greateſt and exacteſt ἀκριβεια imaginable. But a *wiſe* and a *thinking* man can need none of theſe topics; in every hedge and every field they are before him; and yet we do not admire them becauſe they are common and obvious: Thus we fall into the juſt reproach given by one of the Philoſophers (introduced by the Orator) to thoſe who ſlighted what they ſaw *every day*, becauſe they *every day* ſaw them: *Quaſi novitas nos, magis quam magnitudo rerum, debeat ad exquirendas cauſas excitare:* As if *Novelty* only ſhould be of more force to engage our enquiry into the *Cauſes* of things, than the *Worth* and *Magnitude* of the things themſelves.

Cic. de Nat. Deor. l. ii.

FINIS.

An EXPLANATORY TABLE

OF THE

Parts of Fructification of the different Species of Trees described in the SILVA.

OBS. The Parts marked with a Capital Letter are magnified.

The OAK. *Quercus (Robur.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. c. The Calyx. In some Flowers it is divided into four, in others into five Segments.
B. C. Ditto.
d. An Entire Flower.
D. Ditto, shewing the situation of the Stamina.
e. A single Stamen.
E. Ditto.
f. A Female Flower.
F. Ditto.
g. The Acorn, or Nut, as it sits in its permanent Calyx.
Ditto, separated from the Calyx.
The Cup, or permanent Calyx.

The ELM. *Ulmus (Campestris.)*

PENTANDRIA DIGYNIA.

An Entire Flower.
Ditto.
The Calyx.
Ditto.
The Stamina.
Ditto.
The Pointal, or Female Part of the Flower.
Ditto.
The Seed.
Branch, at the time of flowering, which appears before the leaves appear.

The BEECH. *Fagus (Sylvatica.)*

MONOECIA POLYANDRIA.

Catkin of Male Flowers.
Single Flower.
Ditto.
The Calyx.
Ditto.
Female Flower.
The Calyx.
The Germen, or Embryo, with its three Pistils.
The two Embryos with their Pointals, as they rise the Calyx.
The permanent Calyx become a Capsule, or Vessel.
Ditto, as it opens at the top.

The ASH. *Fraxinus (Excelsior.)*

POLYGAMIA DIOECIA.

a. An Entire Hermaphrodite Flower.
A. Ditto. The Flowers have neither Calyx nor Petals, only furnished with two Stamina.
B. The two Stamina.
c. The Embryo, with its Pointal.
C. Ditto.
d. An Entire Female Flower.
D. Ditto. They likewise have neither Calyx, Petals, or Stamina, bearing only a Pointal.
e. A winged Seed. The Seeds of the Hermaphrodite and Female Flowers are alike.
f. The Crust opening to shew where the Seed is lodged.
g. The Seed.

The CHESNUT. *Fagus (Castanea.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. A single Flower.
B. Ditto.
c. The Calyx.
C. Ditto.
d. A Female Bud of Flowers.
e. A single Flower.
f. The Calyx.
F. Ditto.
g. A single Embryo, with its Pointals.
G. Ditto.
H. The two Embryos with their Pointals, set in their permanent Calyx.
i. The spinous Capsule.
k. The same opening at the top to emit the Nuts or Seeds.
l. A single Nut.

The HORSE-CHESNUT. *Æsculus (Hippo-castanum.)*

HEPTANDRIA MONOGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The five Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
f. The spinous Capsule.
g. A Transverse Section of ditto, shewing the

The WHITE BEAM TREE. *Cratægus (Aria.)*

ICOSANDRIA DIGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals, or Flower Leaves.
d. The Stamina.
e. The Pointals.
f. The Embryo, as it sits within the Calyx, with its Pointals.
g. The Fruit, or Berry.
h. A Transverse Section of ditto.
i. A Vertical Section of ditto.
k. The two Seeds.

The WILD SERVICE. *Cratægus (Torminalis.)*

ICOSANDRIA DIGYNIA.

a. An Entire Flower.
A. Ditto.
b. The Calyx.
B. Ditto.
c. The Petals.
C. Ditto.
d. The Stamina.
D. Ditto.
e. The Pointals.
E. Ditto.
f. The Fruit, or Berry.
g. A Transverse Section of ditto.
h. The Seeds.

The WILD BLACK CHERRY. *Prunus (Cerasus.)*

ICOSANDRIA MONOGYNIA.

a. The Calyx.
b. An Entire Flower.
c. The Stamina.
d. A single Stamen.
D. Ditto.
e. The Embryo, with its Pointal.
E. Ditto.
f. The Berry.
g. A Vertical Section of ditto.
h. The Stone containing the Kernel.

The SYCAMORE. *Acer (Pseudo-platanus.)*

POLYGAMIA MONOECIA.

a. The Hermaphrodite Flowers growing on the same bunch with the Male Flowers *f.*
b. The Calyx.
c. The Petals.
d. The Stamina.
E. The Embryo, with its Pointal.
f. The Male Flowers.
G. A Male Flower. The Petals and Stamina are the same as in the Hermaphrodite Flowers.
H. A Male Flower without the Stamina, &c.
i. The two winged Seeds.
k. One of the Wings cut open to shew the situation of the Seed.
l. A Seed.

The LIME. *Tilia (Europæa.)*

POLYANDRIA MONOGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
E. Ditto, with one Stamen and one Petal.
f. The Capsule.
g. A Transverse Section of ditto.
h. The Capsule as it opens below.
i. The Seed.
k. A Bractea, or floral leaf.

The WHITE POPLAR. *Populus (Alba.)*

DIOECIA OCTANDRIA.

a. A Male Catkin.
b. An Entire Male Flower.
B. Ditto.
c. The Scale, or Squama.
d. The Nectarium.
D. Ditto.
E. A single Stamen.
f. The Female Catkin.
g. The Female Flower.
G. Ditto.
h. The Squama, or Scale.
I. The Embryo, with its quadrifid Stigma.
K. The Stigma.
l. The Capsule, or Seed-vessel.
L. Ditto.
m. Ditto, discharging its Seeds.
M. Ditto.
n. The Seeds.
N. Ditto.
o. The Nectarium of the Female Flower.
O. Ditto.

The QUICK-BEAM. *Sorbus (Aucuparia.)*

ICOSANDRIA TRIGYNIA.

The OZIER. *Salix (Viminalis.)*

DIOECIA DIANDRIA.

a. The Male Catkin growing on a different Tree from the Female.
b. A Male Flower.
B. Ditto, with its Nectarium *c*, and two Stamina *d. d.*
E. The Scale and Nectarium.
f. The Female Catkin.
g. A Female Flower.
G. Ditto.
H. The Embryo.
i. The Capsule.
I. Ditto.
K. A Transverse Section of ditto.
L. As it bursts to emit the Seeds.
M. A Seed.

The SCOTCH FIR. *Pinus (Sylvestris.)*

MONOECIA MONADELPHIA.

a. A Male Catkin.
b. The Gem, or Winter-Lodge (Hibernaculum.)
c. The Scale, or Squama.
d. A Cluster of Stamina.
D. Ditto.
e. A single Stamen.
E. Ditto, with its Scale *c.*
f. The future Cone.
g. A single Scale of the Cone, with its two Embryos.
G. Ditto.
H. A single Embryo.
i. The Cone.
k. The same opened to shew how the Seeds are lodged.
l. The inner Side of a Scale.
m. The two winged Seeds.

The WEYMOUTH PINE. *Pinus (Strobus.)*

MONOECIA MONADELPHIA.

a. The Gem, or Winter-lodge (Hibernaculum.)
b. The Male Catkin.
C. A single Stamina, with its Scale.
D. The Scale.
E. A single Stamen.
f. The immature Cone.
g. A single Scale of ditto, with its two Embryos.
G. Ditto.
H. A single Embryo, with its Pointal.
i. A Cone.
k. A single Scale with its two winged Seeds.
l. A Seed.

The SILVER FIR. *Pinus (Picea.)*

MONOECIA MONADELPHIA.

The ORIENTAL PLANE. *Platanus (Orientalis.)*

MONOECIA POLYANDRIA.

a. A globular Catkin of Male Flowers.
b. The Calyx.
B. Ditto.
c. The Entire Flower.
C. Ditto.
d. The Petals.
D. Ditto.
E. The Stamina.
F. A single Stamen.
g. A globular Bunch of Female Flowers.
h. The Calyx.
H. Ditto.
i. An Entire Flower.
I. Ditto.
k. The Petals.
K. Ditto.
L. The Embryo, with its Pointal.
m. The globular Cluster of Seeds.
n. The Receptacle to which the Seeds are affixed.
O. A Seed.

The OCCIDENTAL PLANE. *Platanus (Occidentalis.)*

MONOECIA POLYANDRIA.

a. A globular Cluster of Male Flowers.
b. The Calyx.
B. Ditto.
c. An Entire Flower.
C. Ditto.
d. The Petals.
D. Ditto.
E. The Stamina.
F. A single Stamen.
g. A globular Bunch of Female Flowers.
h. The Calyx.
H. Ditto.
i. An Entire Female Flower.
I. Ditto.
k. The Petals.
K. Ditto.
L. The Embryo, with its Pointal.
m. The globular Cluster of Seeds.
n. The Receptacle to which the Seeds are affixed.
O. A Seed.

The CORK TREE. *Quercus (Suber.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. c. The Calyx, in some quadrifid, and in some quinquefid in the Male Flowers.
B. C. Ditto.
d. An Entire Flower.

ermanent Calyx become a Capſule, or
ſſel.
as it opens at the top.
e two ſeeds.

HORNBEAM. *Carpinus (Vulgaris.)*

MONOECIA POLYANDRIA.

Male Catkin.
A Male Flower with its Scale.
Ditto.
The Scale.
Ditto.
The Stamina.
The Female Catkin.
The Female Flower with its Scale.
Ditto.
The Scale.
The Petals.
H. Ditto.
The two Pointals.
I. Ditto.
k. The Petals grown larger, containing the two Seeds.
l. One of the Seeds.

The WALNUT. *Juglans (Regia.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. Ditto, in its natural ſize.
c. A ſingle Male Flower.
d. The Petals.
e. The Stamina.
E. A ſingle Stamen.
f. The Female Flowers.
g. Ditto in their natural ſize.
h. The Calyx.
i. The Corolla.
k. The Embryo, with its Pointals.
l. The covering of the Shell. *Drupa.*
m. The Nut diveſted of its covering.
n. Ditto, ſplit open.
o. A Kernel.
a. The Stamina.
e. The Embryo, with its Pointal.
f. The ſpinous Capſule.
g. A Tranſverſe Section of ditto, ſhewing the Partition and Receptacle.
b. Ditto, as it opens in three diviſions.
i. The Nuts or Seeds.

The MAPLE. *Acer (Campeſtre.)*

POLYGAMIA MONOECIA.

a. The Hermaphrodite Flowers growing on the ſame Bunch with the Male Flowers *f*.
A. An Hermaphrodite Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
E. Ditto.
g. A Male Flower without the Stamina, &c.
G. Ditto. The Calyx, Petals, and Stamina are the ſame as in the Hermaphrodite Flowers.
h. The two winged Seeds.
i. One Wing cut open to ſhew the ſituation of the Seeds.
k. A Seed.
c. A Vertical Section of ditto.
b. The Stone containing the Kernel.

The QUICK-BEAM. *Sorbus (Aucuparia.)*

ICOSANDRIA TRIGYNIA.

a. An Entire Flower.
A. Ditto.
b. The Calyx.
B. Ditto.
c. The five Petals, or Flower leaves.
C. Ditto.
d. The Stamina.
D. Ditto.
e. The Embryo, with its three Stigmata.
E. Ditto.
f. The Fruit, or Berry.
g. A Tranſverſe Section of ditto.
h. The three Seeds.

The HASEL. *Corylus (Avellana.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. A ſingle Male Flower.
B. Ditto.
c. The Stamina.
C. Ditto.
D. A ſingle Stamen.
e. The Female Flowers.
E. Ditto.
f. Two lacerated Scales that incloſe the Embryo with its two Pointals.
F. Ditto.
g. The Embryo, as it ſits in the two Scales.
G. Ditto.
b. The Embryo.
H. Ditto.
i. The Nut.
k. A Vertical Section of ditto.
l. The Kernel.

The BIRCH. *Betula (Alba.)*

MONOECIA TETRANDRIA.

a. The Male Catkin.
b. The Calyx, conſiſting of three Scales containing three Flowers.
B. Ditto.
C. The three Flowers with their three Scales.
D. A ſingle Flower.
R. Its four Segments.
F. The Stamina.
g. The Female Catkin.
b. The Calyx, conſiſting of three Scales, each Scale containing two Embryos.
H. Ditto.
i. The Embryo, with its two Pointals.
I. Ditto.
k. The three Scales, each Scale containing two Seeds.
K. Ditto.
l. A Seed.
L. Ditto.

The ALDER. *Betula (Alnus.)*

MONOECIA TETRANDRIA.

a. The Male Catkin.
b. The Calyx, conſiſting of four Scales which contain three Flowers.
B. Ditto.
C. The three Flowers.
D. A ſingle Flower.
E. The Petals.
F. The Stamina.
g. A Female Catkin.
b. The Calyx, conſiſting of three Scales, each Scale containing two Embryos.
H. Ditto.
i. The Embryo with its two Pointals.
I. Ditto.
K. The Cone, or Fruit.
L. The three Scales, each containing two Seeds.
m. A Seed.
M. Ditto.

The SILVER FIR. *Pinus (Picea.)*

MONOECIA MONADELPHIA.

a. The Gem, or Winter-lodge (Hibernaculum.)
b. A Male Catkin.
C. A ſingle Stamen, with its Scale.
D. The Scale.
E. A Stamen.
f. The Female Catkin, or future Cone.
g. A ſingle Scale, with its two Embryos.
G. Ditto.
H. A ſingle Embryo, with its Pointal.
i. The Cone.
k. A ſingle Scale, with its two winged Seeds.
l. A ſingle Seed.

The SPRUCE FIR. *Pinus (Abies.)*

MONOECIA MONADELPHIA.

a. A Catkin of Male Flowers.
b. A ſingle Stamen.
B. Ditto.
c. The future Cone.
d. A ſingle Scale, with its two Embryos.
D. Ditto.
e. The Embryo, with its Pointal.
E. Ditto.
f. The Cone.
g. A ſingle Scale, with its two winged Seeds.
h. A Seed.

The LARCH. *Pinus (Larix.)*

MONOECIA MONADELPHIA.

a. A Male Flower.
b. The Calyx.
c. The Calyx, ſhewing the ſituation of the Stamina.
C. A ſingle Stamen.
d. The Female Flowers, or immature Cone.
e. A ſingle Scale, with its two Embryos.
E. Ditto.
f. A ſingle Embryo, with its Pointal.
F. Ditto.
g. A Cone.
h. A ſingle Scale, with its two winged Seeds.
H. Ditto.

N. B. This Figure is the American Larch.

The MULBERRY. *Morus (Nigra.)*

MONOECIA TETRANDRIA.

a. A Male Catkin.
B. The Calyx.
c. A Male Flower.
C. Ditto.
D. One Stamen.
e. A Female Catkin.
f. A Female Flower.
F. Ditto.
G. The Calyx.
H. The Embryo, with its two Stigmata.
i. The Fruit, conſiſting of many Berries.
k. A ſingle Berry.
l. A Seed.
L. Ditto.

The CEDAR. *Pinus (Cedrus.)*

MONOECIA MONADELPHIA.

a. A Male Catkin.
b. A ſingle Scale, with its Stamen.
B. Ditto.
c. The future Cone.
d. A ſingle Scale of the Cone, with its two Embryos.
D. Ditto.
e. A ſingle Embryo, with its Pointal.
E. Ditto.
f. The Cone.
g. A ſingle Scale, with its two winged Seeds.
h. A ſingle Seed.

The STRAWBERRY TREE. *Arbutus (Unedo.)*

DECANDRIA MONOGYNIA.

a. The Calyx.
A. Ditto.
b. The Corolla.
c. The ſame cut open, to ſhew the ſituation of the ten Stamina.
C. A ſingle Stamen.
d. The Embryo with its Pointal, ſituated within the Corolla.
D. Ditto.
e. The Fruit.
f. A Tranſverſe Section of ditto.
g. A Vertical Section of ditto.
h. The Seeds.

The YEW. *Taxus (Baccata.)*

DIOECIA MONADELPHIA.

a. A Male Flower.
A. Ditto.
B. The Calyx.
D. The Stamina.
E. Two Stamina, one viewed in front, the other on the underſide.
f. The Female Flower.
F. Ditto.
G. The Calyx.
I. The Embryo, with its Pointal.
k. The Fruit, or Berry.
l. A Vertical Section of ditto.
m. The Seed.

The HOLLY. *Ilex (Aquifolium.)*

TETRANDRIA TETRAGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo.
E. Ditto.
f. The Berry.
g. A Tranſverſe Section of ditto, ſhewing the Conceptacle.
h. The Seeds.
H. A Seed.

The HAWTHORN. *Cratægus (Oxyacantha.)*

ICOSANDRIA DIGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
D. One Stamen.
e. The Embryo, with its Pointal.
f. The three Pointals.
g. The Berry, or Fruit.
h. The Stone, containing the Kernel.
b. c. The Calyx, in ſome quadrifid, and in ſome quinquefid in the Male Flowers.
B. C. Ditto.
d. An Entire Flower.
D. Ditto.
e. A ſingle Stamen.
E. Ditto.
f. The Female Flowers.
g. A ſingle Flower.
G. Ditto.
H. A Vertical Section of ditto.
i. The young Acorn or Fruit.
I. Ditto.
K. A Vertical Section of ditto.

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